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[656]

Competition by roads, waterways and airways.

(Continuation) (1).

(Italy, Algeria, French Indo-China).

ITALY.

The information published below is taken from a note received from the General Management of the Italian State Railways.

1. *Tariff measures.*

The two kinds of return tickets known as « holiday » tickets and « week-end » tickets have been made into a single category. This new kind of return ticket can be issued at any station to any other station within a radius of 250 km. (155 miles) and is available from midday on the day before the holiday. The return half can be used on the holiday itself or the day after up to 12 o'clock (noon). Such tickets show a reduction of 50 % in the case of single passengers, and 70 % in the case of groups of at least 5 persons.

The sale of this kind of ticket, valid in the regional traffic zones, shows a definite tendency to increase in comparison with previous years.

2. *Measures relating to road transport.*

The decree of the 2nd December 1935 imposed a tax on transport in motor vehicles. The tax is fairly high. At the same time, the railway rates were slightly but judiciously increased.

Some of the principal clauses of this decree are the following :

Clause 1 imposes a tax on all goods transport worked over an ordinary road or motor road by a motor vehicle with or without a trailer. The amount of the tax is 1.2 centisimi per quintal-kilometre if the transport is worked on behalf of a third party, and 0.8 centesimo per quintal-kilometre in the case of goods belonging to the owner of the vehicle used.

According to clause 2, in the case of transport on behalf of a third party, the State tax is due from the person on whose behalf the transport is worked, and must be paid beforehand.

The consignor must fill up, in triplicate, a form of the prescribed type, one

(1) See *Bulletin of the Railway Congress*, June 1934 and subsequent numbers.

copy to remain in his own possession, one to be kept by the carrier, and the third to travel with the goods.

Clause 3 makes it obligatory to keep a register of all transport worked on behalf of a third party, and specifies in detail all the entries to be made.

Clause 4 makes it obligatory to keep a register with counterfoil for all transport worked by a carrier on his own behalf.

Clause 5 gives particulars of how the taxes are to be paid.

Clause 8 exempts from this tax transport worked within town limits.

Transport within a province is also exempt if the goods belong to a carrier using his own vehicles, and if they are used in the normal activity of a rural undertaking, as is transport between a town and its railway or light railway station.

Clause 9 states the exceptions, particularly those in favour of motor vehicles used for public passenger transport services, also authorised to carry luggage and small consignments of agricultural products, and those used for goods transport in connection with the railways and tramways; also in favour of motor vehicles and small lorries privately used in the transport of persons occasionally carrying goods for the exclusive use of the owner, and motor vehicles used in connection with the Post Office services.

The decree imposes fines for infringements of the regulations dealing with the payment of the taxes and the completion of the prescribed forms and registers.

If the offence is repeated, the Minister of Communications, acting on the advice of the Financial Superintendent, can order the temporary or permanent withdrawal of the licence.

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ALGERIA

Algerian Railways.

The Management of the Algerian State Railways and the Algerian lines of the Paris-Lyons-Mediterranean Railways sent us the following information about the measures taken to fight competition during the 4th quarter of 1935.

1. *Steps taken by the railways.*

Passenger traffic. — The new zone fares resulted, taking the year 1935 as a whole, in the receipts showing an increase of about 1 500 000 francs, or 2.28 %, over those for 1934. This result is also due to a great extent to the improved timetables.

Goods traffic. — New tariffs including special rates for 3 or 5-ton wagon loads, and a rate for each ton over and above this weight have just been put into force on certain lines where competition is particularly severe; in certain cases they have led to the tonnage carried being doubled.

Motive power and rolling stock. — During the 4th quarter of 1935, two diesel railcars with two trailers were put into service on the Bône-Saint-Charles and Bône-La Calle lines, and negotiations are in hand with the Renault Company for the purchase of three double V. N. type A. B. V. railcars, to be delivered about October 1936.

2. *Co-ordination measures.*

Passenger traffic. — The co-ordination of rail and road transport has entered upon an active phase in the case of passenger traffic. A first stage is on the point of completion, namely the rationalisation of road services by eliminating useless competition on the road and also the ex-

cessively long runs worked by certain firms with too few vehicles. In most cases this will lead to a noteworthy reduction, which in some cases will be as much as 50 %. At the same time, the rates charged by these firms have been raised, to bring them as close as possible to the railway rates.

In view of the small density of the railway system — 4 000 km. (2 500 miles) of line for a country of 21 million hectares (51.9 million acres), — part of which are simply penetration or strategic lines, there can be no question of compensating road firms paralleling the railway. The duties paid by the road firms will be devoted to buying out undertakings which in actual fact duplicate the railway. The railway is, moreover, making provision for buying up the long-distance services, which cause it the greatest loss. Thus the Alger-Oran motor service has just been discontinued.

Goods traffic. — The decree on co-ordination of goods transport has just been issued. It seems that, as in the case of passenger transport, the first step is to make the present situation more logical. The decree imposes upon motor transport undertakings duties based on the tonne-kilometres; these duties would only have to be paid when the co-ordination policy is put into force. The carriers are, however, prepared to pay a tax even now, to make it possible to buy out a least a part of the excess tonnage. It would then be possible to find a formula on which to agree to the distribution of the remaining traffic among the surviving firms. As things are at present, there is such a multitude of small carriers and such inflation of tonnage, that agreements would be rendered impossible in practice, as it would be well nigh impossible to see that they are carried out.

FRENCH INDO-CHINA

Compagnie française des Chemins de fer de l'Indochine et du Yunnan.

Among the steps taken during the 3rd quarter of 1935 to fight competition, this Company mentions the introduction of a special rate applicable to passenger transport in railcars, and the drawing up of a special rate for the transport of vegetable fuel oils to Tonquin in the Lao-Kay-Hanoi-Hai Fong direction.

Other steps have also been taken during the 4th quarter of 1935, as follows :

I. *By the Company.*

The steps taken on the initiative of the Company deal with modifications in the rates.

In the case of *passenger traffic,* it has been decided that the regulations on the weight of luggage carried free of charge by 4th-class passengers (increased to 30 kgr. = 66 lb.) shall be continued during 1936, as well as those for reduced transport rates within the first zone, and fixed rates for certain runs.

In the case of *goods traffic,* the changes introduced by the regulations to remain in force until the 31st December 1936 include rate reductions in the form of fixed prices for consignments made according to various special rates (four in all), some of them express, others slow, some from or to Hai-Fong, others transport between Hanoi and Hai-Fong, in either one or both directions.

Three of these special rates call for several minimum weights. Two of them include door-to-door delivery unless stated otherwise by the consignor.

Rebates of 10 % are granted on the total traffic carried when the tonnage sent within three months by the same consignor reaches a given figure.

II. *Steps taken by the Public Authorities.*

Two decrees issued by the Governor General of Indo-China have been put into force.

The first classes under various categories routes served both by railway and road, and fixes the duties to be paid by motor transport services on each of these routes.

The second regulates the way applications for authorization to operate a motor service shall be put forward, and the conditions under which licences are to be granted.

[621. 135. (01 & 621. 135.3]

Resonance in rolling stock, and a few methods to meet it,

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General.

Although resonance frequently occurs in mechanics, engineers generally note it with dismay as it upsets their expectations.

Usually resonance is not directly apparent but is revealed by its result, the failure of some part; for example, a detail with a safety factor of 5 or even 10 fails systematically although its fatigue stresses should be very low. Almost without exception, the breakage is due to resonance setting up a secondary vibration, the amplitude of which increases at each oscillation and inevitably results in a fracture if the increase in amplitude is not prevented.

* * *

Probably railway engineering has more resonance problems to tackle than any other application of modern mechanics, for the following reasons :

The rail surface is cut up into equal lengths and each rail joint, by dipping slightly, causes the vehicle passing over it to drop at regular intervals. The sleepers too, which carry the rails and affect the vertical flexibility of the track, are spaced at equal distances. Finally the running gear is subjected to periodical movements fixed in time or in space. A single pair of wheels with coned tyres which move on straight track oscillate to the right and then to the left with a regular period in space, depending on the conicity of the tyres, the diameter of the wheels, and the gauge; the same action occurs in the case of a four-wheeled bogie (*).

It follows that every railway vehicle is caused by its running gear to move up and down and from one side to the other at regular intervals. If there are a number of pairs of wheels, it is most probable that the resonance movements of the whole vehicle will be neutralised by the difference in phase of the different wheels of the same vehicle. This difference in phase may, however, cease at a given moment and result in uncontrollable movements ending in an accident. This fact, fortunately very unusual, precisely because it is unusual, will lead to the stock or methods to be blamed, although they probably have very little to do with it.

Unfortunately it is very difficult to analyse so delicate a problem. We can only give a complete solution of such simple problems as that of a mass M suspended above a single axle by a spring of known flexibility $\frac{1}{\lambda^2}$ and damped by a resistance μ^2 proportional to the speed, the axle being subjected to an imposed

(*) *Revue Générale des Chemins de fer*, January 1933, article by M. Mauzin.

periodical vertical movement at the rate ω and of amplitude A. The formula of this movement is :

$$m\frac{d^2x}{dt^2} + \mu^2\frac{dx}{dt} + \lambda^2 x = \lambda^2 A \sin \omega t + \mu^2 A \omega \cos \omega t.$$

We will not give the solution of this classical equation as this very simple case never occurs in practice, railway vehicles always having 2, 3 or 4 pairs of wheels more or less loosely connected. Furthermore, in most cases the constants of the problem are not really known, namely : the mass, flexibility and damping. The mass is often difficult to evaluate. Let us consider a crank axle : what part of the connecting rod should be allotted to each web? The least play in the pin introduces considerable disturbance in the influence of the masses caused to vibrate by torsion in the shaft. The flexibility of a spring is usually well known, but besides the part actually known as the spring many parts of the mechanism are deformed elastically and set up parasitic movements.

As we all know, a locomotive frame, when running, deflects laterally by several centimetres and so forms a spring the flexibility of which cannot be calculated.

The calculation of the frictional resistances and damping forces is even more involved, as the braking action due to molecular friction as well as to rubbing friction between the parts, whether assembled or not, which varies with the condition of the surfaces and possibly with the lubricants used, has to be taken into account.

The above remarks illustrate the difficulty of dealing with resonance problems by calculation. We have abandoned this method, and instead have endeavoured to deal experimentally with some well defined cases of resonance.

The very typical results obtained on the Paris Orléans-Midi Railways are sufficiently interesting to be published in this review. First of all we will deal with the spring gear and then with the hunting of railway vehicles.

Known methods of preventing resonance.

Before beginning this investigation we will, however, briefly review the methods so far used to prevent resonance. In the springing as well as in the hunting of vehicles, engineers have sought protection from resonance by introducing mechanical friction. At the present time, a spring gear not affected by resonance is obtained by using laminated springs which lessen the vertical oscillations but do not always prevent them. We all know that the last vehicle of a train has a critical speed, depending on the length of the rails, at which vertical oscillations are set up and become unpleasant unless the speed of the train is changed. The same vehicle may ride quite well in the middle of the train at all speeds owing, we think, to the additional frictional resistance between the buffers which are strongly pressed againt each other (when the initial compression is 4 tons the frictional force between the faces of the buffers is some 800 kgr. = 1 770 lb.).

Now, the laminated spring has one serious drawback as regards comfort : when it has taken up the position in which it is in equilibrium relatively to the two masses connected together, at least twice the static load is required to overcome the friction between the plates. This force is relatively high so that all smaller stresses are transferred unchanged from one of the masses to the other. The vi-

brations of the carriage bogie bolster are therefore almost entirely transmitted to the body bolster, and thence to the body.

To remedy this drawback, we thought, some fifteen years ago, of replacing the friction springs by frictionless springs (*); to prevent resonance we used springs of different flexibility, i.e. aperiodic. Some fifty *Midi* railway carriages are fitted up in this way.

Unfortunately, at that time the only way we could obtain aperiodicity was by carrying the whole load on frictionless coiled springs and to use, in parallel, sets of opposing springs of different periods and varying flexibility.

The effect of the latter springs, nil when the body is in its normal position, increases rapidly when the body moves above or below this equilibrated position. In other words, their action has a zero position, and to get the desired effect, the two springs must be in their zero position under the normal load of the vehicle.

Unfortunately, the difficulty of obtaining coiled springs which do not gradually present a permanent set has for a long time prevented this spring gear being fully developed, as the alteration in the deflection of the coiled springs made it necessary to adjust the O height of the opposing nests. A suitable steel for these springs is now available and the coaches in question are giving good service.

The problem would have been solved much more quickly and easily, had there been available a good damping device without a zero position, such as is now available.

(*) *Revue Générale des Chemins de fer*, December 1920 : « Nouvelle suspension pour voitures à bogie » (New spring gear for bogie carriages).

Briefly speaking, a good suspension gear should protect the body from resonance movements of large amplitude due to momentary synchronisation, and prevent it being affected by small-amplitude vibrations of high frequency.

Frictionless springs therefore should be used in conjunction with a damping device able to absorb, without appreciable reaction, the small-amplitude parasitic vibrations, and to brake the large oscillations which are proportionally more violent as they are faster; the damping device, in the case of a sudden shock, should cut out after it has limited the transmitted forces to a predetermined maximum, like a safety valve, to prevent any parts failing.

For years we have been in search of such a damping device; we think we have found the type required in the *Broulhiet* shock absorber, fitted to many motor vehicles, and which the Paris Orléans-Midi Railways have adapted to railway rolling stock. This shock absorber has the great merit that it can be regulated to suit any given rate of damping in terms of the speed with the greatest ease.

Description of the Broulhiet hydraulic shock absorber.

We will now describe this shock absorber in some detail (figs. 1, 2, and 3).

The Broulhiet shock absorber in principle consists of two cylinders A and B filled with oil and separated by the partition M (fig. 3).

Two pistons A' B' driven by the same rocking lever oscillating about the fixed shaft O can move inside the cylinders A and B. A lever L fastened to the fixed shaft A is coupled to the member to be damped. The partition M is fitted with

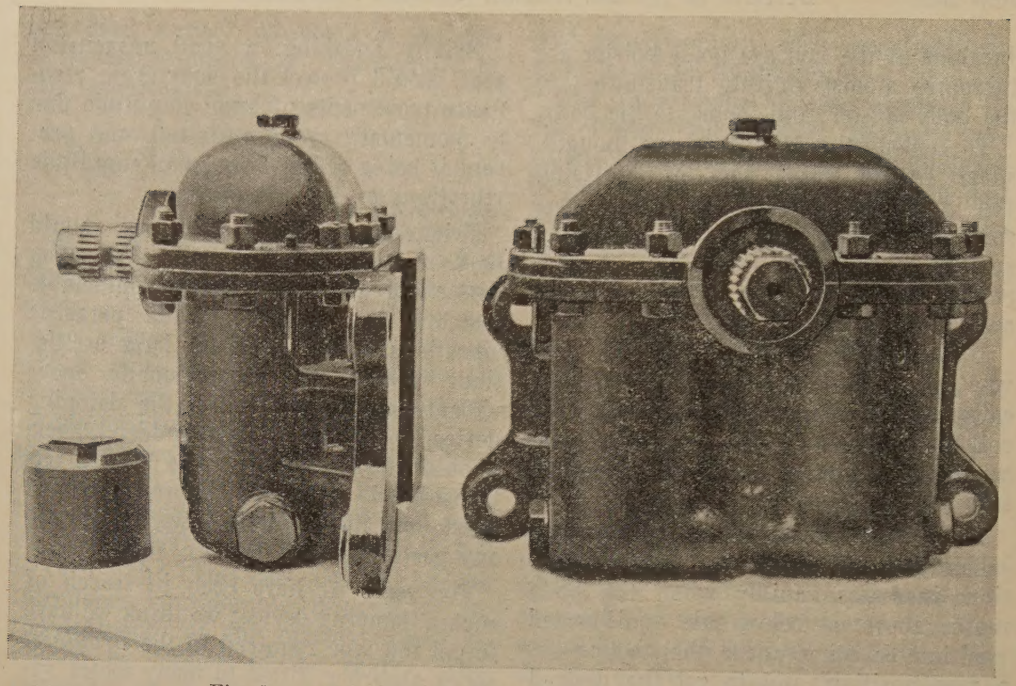


Fig. 1. — Outside view of damper (shock absorber).

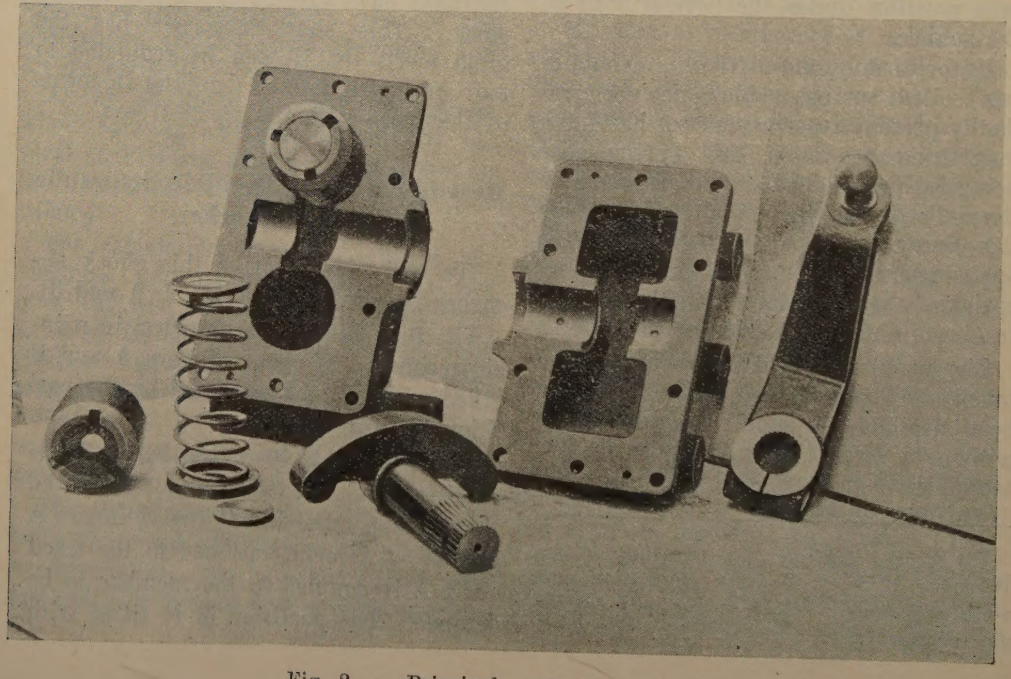


Fig. 2. — Principal parts of a damper.

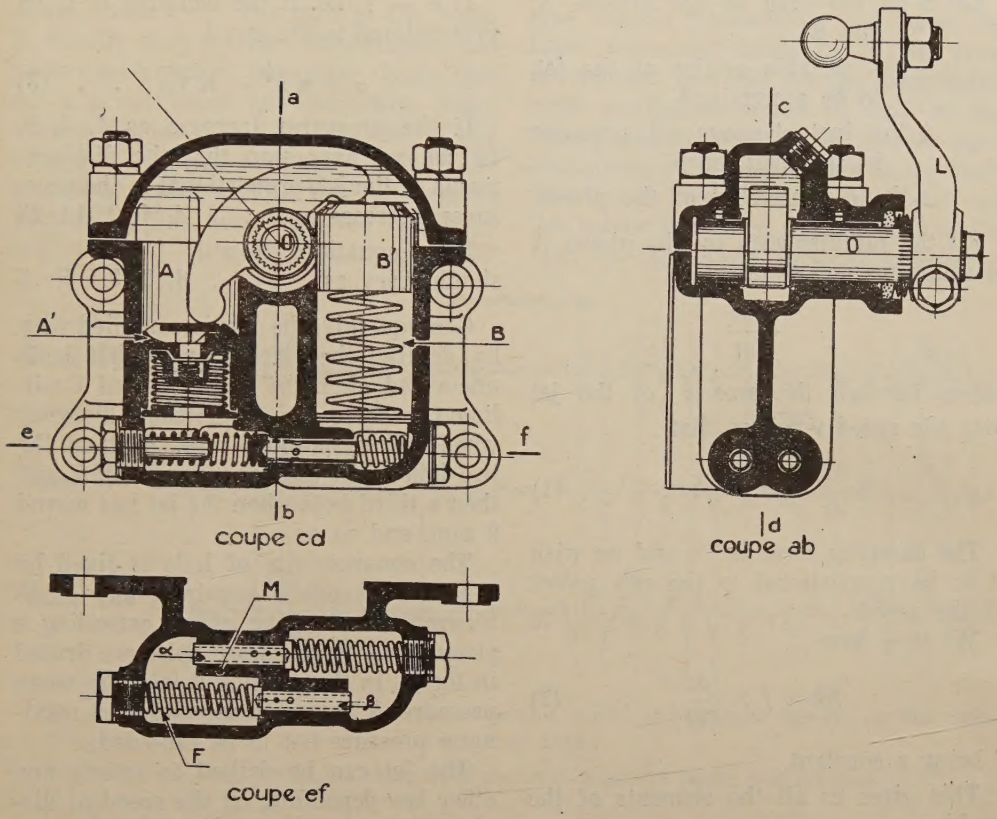


Fig. 3. — Diagrammatic section of a damper.

Note: Coupe = Section.

two valves with variable orifices, one α allowing the liquid to pass from A to B only, and the other β, from B to A. These valves are piston valves whose movement is opposed by springs F without initial tension when in the closed position : the stroke of these pistons, therefore, is proportional to the pressure acting on them. The orifices in each piston valve which, following automobile practice, is called a « jet », are located and dimensioned to suit the degree of damping required, oil of course only passing through a hole when the jet has moved far enough to bring the hole clear of the partition M separating the two chambers A and B. When piston A' descends, it forces the oil through the jet α under piston B', and the pressure forcing down the piston varies with the position of the jet and the size of the holes. Let us suppose the relative movement of the shock absorber itself and its lever is to be damped down in proportion to the nth power of the speed.

Let S be the area of the pistons A' and B',

σ the variable orifice of the jet, to be ascertained,

h the instantaneous oil pressure in the cylinder A,

z the displacement of the piston.

All the oil displaced by the piston A in unit time and equal to

$$S\frac{dz}{dt}$$

passes through the area σ of the jet with the speed $\sqrt{2gh}$ so that

$$S\frac{dz}{dt} = \sigma\sqrt{2gh} \quad . \quad . \quad . \quad (1)$$

The damping force is Sh and we wish it to be proportional to the nth power of the speed.

We then have

$$Sh = f \times \left(\frac{dz}{dt}\right)^n \quad . \quad . \quad (2)$$

f being a constant.

This gives us all the elements of the problem.

Raising (1) to the nth power, and multiplying the two equations (1) and (2) factor by factor, we get :

$$\sigma = K\, h^{\frac{1}{n} - \frac{1}{2}}$$

K being a definitely known constant.

This formula gives the law σ has to follow for the damping to be proportional to the nth power of the speed.

If $n = 2$, $\sigma = K$, the orifice should be of constant sectional area. A plain hole is used and the liquid flows through a constant sectional area as in most hydraulic shock absorbers. Experience has shown that the damping out is too quick, and is shattering at high speeds.

If $n - 1$, i.e. if the damping is to be proportional to the speed

$$\sigma = K\, h^{\frac{1}{2}} = K\sqrt{h} \quad . \quad . \quad (3)$$

If the pressures increase as 1, 4, 9, 16, 25, we have seen that the displacements of the jet, proportional to the pressures, increase as . . . 1, 4, 9, 16, 25

From equation (3) σ should vary as . . . 1, 2, 3, 4, 5

Consequently, the law is complied with by drilling the first hole so that it is uncovered when the jet has moved 1 millimetre, the second of the same diameter when it has moved 4 mm., as then the two holes will discharge in parallel, and then a third hole when the jet has moved 9 mm. and so on.

The common size of hole is fixed by the braking power required, and so as to avoid the braking effort exceeding a given value, large release holes are drilled in the jet in the position it takes up when pressure h corresponds with the maximum pressure not to be exceeded.

The jet can be drilled to satisfy any other law depending on the speed of displacement.

It will be noticed that not only is damping double-acting but it is independent in each direction, so that the rate can be made different in the two directions if so desired. This great flexibility in the device enables us to consider damping out the most complex movements.

I. — Hunting.

Hunting of railway vehicles is nearly always due to the periodic movement to the right and left induced in a pair of wheels by the conicity of the tyres.The law of the motion of a pair of wheels along the track is fairly simple when the gauge is constant; it is the classical problem of the

double cone (*). The case of the bogie is already more complex theoretically, but numerous practical tests have shown that on a given track any particular bogie always follows the same trajectory and always comes into contact with the rails at the same places. This little understood peculiarity has been observed especially with vehicles with two motor bogies (BB type electric locomotives) and when the bogie movement relatively to the body is recorded, not only are the same maximum oscillations found to occur at the same places in the track but also the same harmonics. The amplitudes of the body movements increase with the speed and the values are more or less homothetic (fig. 4). The bogie, in short, appears to

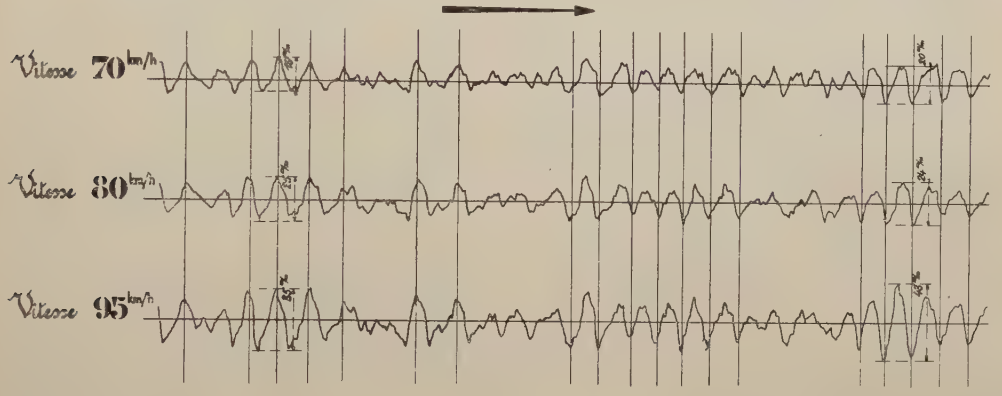


Fig. 4. — Relative movements between body and bogie, at different speeds, on the same section of track.

Note: Vitesse 70 km./h. (80 km./h.-95 km./h.) = Speed 43.5 (50/59) miles per hour.

follow the track much like a gramophone needle which always follows the sinuosities of the groove in the record. In the case of bogies without bolster, the body is flexibly supported on the wheels through the bogie frame, springs, etc. So long as the running speed is low, the two body centres follow very closely the two paths of the geometric centres of the bogie as determined by the points were the wheels strike the rails.

As soon as the speed increases, the inertia of the body and the bogies comes into play, and as a result of the elastic deformation of the axles, bogie frames, springs, and even parts of the body, the latter begins to hunt to a much greater extent than the geometric displacement of the driving wheels relatively to the track. If the speed increases still further, the time comes when the period of the hunting oscillations of the system « body-bogie frame » synchronises with the period of the bogie movement to the right and to the left in the track. The motion of the body can then become excessive and cause deformation of the track.

When the bogies are fitted with bolsters, the single vehicle starts to hunt much sooner.

The forces F to which the track is subjected by a vehicle hunting can be calculated very simply. We *often recorded*

(*) *Revue Générale des Chemins de fer*, January 1933, article by M. Mauzin.

side movements of 100 mm. (3 15/16 inches) at the body ends of BB locomotives (without bolsters), the periodicity being 90 full oscillations per minute.

The body is 11.60 m. (38′ 5/16″) long and weighs 36 tons; its radius of gyration is about 3.30 m. (10′ 10″) and the distance between bogie centres 5.50 m. (18′ 9/16″).

We may consider the motion as being sinusoidal, and the whole of the energy accumulated through the rotation about the vertical through the centre of gravity when the locomotive centre line is parallel to the track as being released at the end of the movement and converted into pressure on the rail.

The movement of the body round the vertical through the centre of gravity is :

$$\vartheta = \Theta \sin \omega t \text{ with } \Theta = \frac{100}{5\,800} = \frac{1}{58}$$

and

$$\omega = 2\,\pi f = 2\,\pi \frac{90}{60} = 9.4.$$

The angular speed when passing along the centre line of the track is given by

$$\frac{d\vartheta}{dt} = \Theta\,\omega \cos \omega t$$

$$\left(\frac{d\vartheta}{dt}\right)_{max} = \frac{1}{58}\,9.4 = 0.16 = \frac{1}{6.2}.$$

Now, the moment of inertia of the body is

$$I = M\rho^2 = \frac{36\,000 \text{ kgr.}}{10} \times 10 = 36\,000$$
$$= 3.30 \text{ m. approx.}$$

The potential energy in the body is therefore :

$$\frac{1}{2}\,I \left(\frac{d\vartheta}{dt_{max}}\right)^2 = \frac{1}{2}\,\frac{36\,000}{38} = 950 \text{ kgrm.}$$
$$= 6\,870 \text{ ft./lb.}$$

To counteract this kinetic energy there is available the moment set up by the reactions at the two bogie centres which progressively increase from 0, when the vehicle is parallel to the track to F when the vehicle reaches its maximum displacement, $\frac{1}{58}$. The work of the couple consequently becomes :

$$\frac{1}{2}\,F \times 5.50 \text{ m.} \times \frac{1}{58} = 950 \text{ kgrm.}$$
$$(6\,870 \text{ ft./lb.}).$$

F = 10 000 kgr. (22 040 lb.) per bogie centre, i.e. 5 tons per pair of wheels.

We have ignored the weight of each of the bogies, 20 tons, which would increase the force acting on the track. Nor have we taken play into account; now, while the play is taken up, no energy is absorbed, so that the whole has to be damped out during the rest of the movement, i.e. during a shorter movement, which increases the pressure proportionally. This means that the rail pressure may well be 5 to 10 tons per axle, which is quite sufficient to deform the track.

This periodic movement of the body relatively to the bogie, the amplitude of which is fairly proportional to the speed, can be prevented by introducing between the body and the bogie, in a position where the relative movement is considerable, a damping device acting proportionally to the speed. Slow movements such as those due to the displacement of the bogie on straight track at low speed or to the rotation of the bogie on entering curves will take place without appreciable effort and consequently without any constraint as between bogie and body. Quick movements, on the other hand, such as those due to the bogie hunting at high speed, will be damped out, either by preventing resonance between the body

and the bogie considered as the cause of the disturbing forces (whilst not preventing the bogie from moving on its own), or by the damping device being secured to the body so as to prevent the bogie following its normal cycle by making one or more pairs of wheels slide across the track, so as to force the bogie into a less oblique position.

The lateral force exerted on the track by this continual movement of the wheels obviously equals at most the adhesion, or about 4 tons for a 20-ton axle load. We say « at most » because the centering action in question is probably a zigzag motion, and so requires a smaller force than that needed to overcome the frictional resistance of a non-rotating axle.

The records we have taken, though still incomplete, lead us to think that, according to the flange play and the state of the track, there is sometimes simple damping without any side movement of the wheels and sometimes damping with side movement.

Application to BB type locomotives.

We began by fitting 90-mm. (3 17/32 in.) diameter Broulhiet dampers with a maximum capacity of 1 000 kgr. (2 205 lb.) acting at the end of a 250-mm. (9 7/8 in.) lever, to two classes of bogie electric locomotors :

1. to motor brake vans of relatively light weight but with entirely free bogies;

2. to a BB Alsthom type locomotive, No. E. 4644, the bogies of which are coupled together to transmit the tractive effort.

We then fitted 100-mm. (3 15/16 in.) diameter, 1 600-kgr. (3 530 lb.) dampers at the end of a 250-mm. (9 7/8 in.) lever to two classes of electric locomotives with free bogies :

1. Oerlikon BB type locomotives E. 175, and E. 141 to 155;

2. Alsacienne BB type locomotive E. 209.

The bogie of the first two classes of locomotors, motor brake vans and Alsthom BB locomotive, are not fitted with bogie bolsters, the body resting on an inverted centre carried directly on the central cross bearer without springs. The bogies of the second set — the Oerlikon

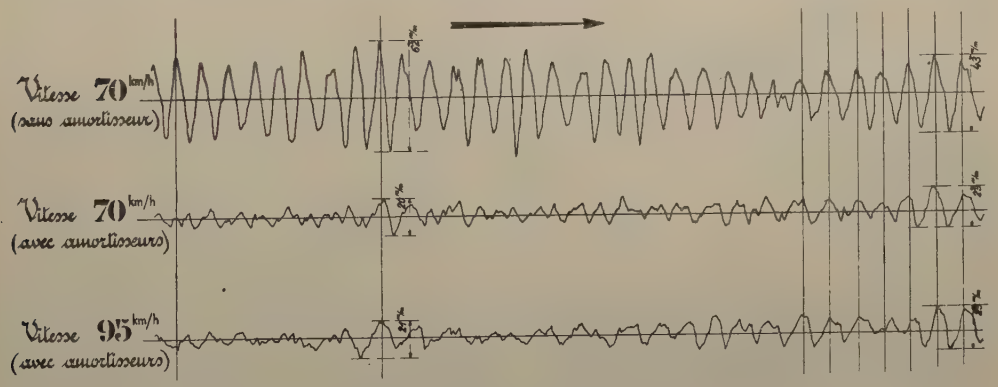


Fig. 5. — Relative movements between body and bogie for locomotive E 209 with and without dampers.

Note: Sans (avec) amortisseurs = Without (with) dampers.

Fig. 6. — Dampers as fitted to motor brake van.

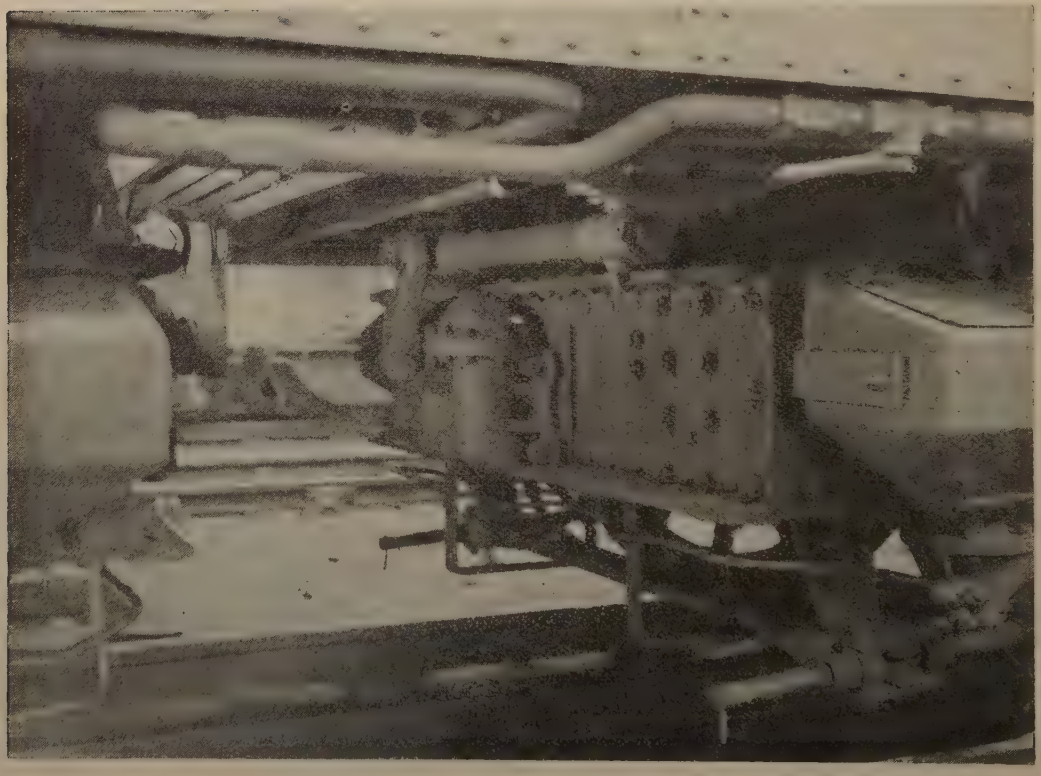


Fig. 7. — Dampers fitted to locomotive E 175.

and Alsacienne locomotives — are fitted with bogie bolsters.

In all four cases the result was perfect, the body being completely stable, even at 105 km. (65.3 miles) an hour in all three classes of locomotive [the brake van having been built for a maximum speed of 85 km. (52.8 miles) an hour].

Figure 5 shows the relative movements between body and bogie of the BB type locomotive No. E. 209 with and without dampers. The oscillations at 95 km. (59 miles) an hour without dampers has not been given as, owing to hunting, it was found impossible to exceed 70 km. (43.5 miles) an hour.

The trial with locomotive E. 209 was, in our opinion, most convincing. We selected the locomotive with the greatest mileage to its credit since its last overhaul (about 80 000 km. or 50 000 miles) so that it should be in the worst working order. Without doing any repairs to it or taking up any play, we fitted two dampers, one between each end of the body and the headstock of the corresponding bogie. The locomotive which could only run up to 70 km. (43.5 miles) an hour without excessive hunting ran perfectly steadily at 105 km. (65.3 miles) an hour on the first trip with dampers, on the 29th April 1935. At the time this article was written (November 1935) this locomotive No. 209 is still in service, without any repairs having been done to it or to the damper, and without the efficiency of the damper falling off.

Figures 6 and 7 show how the different locomotors have been fitted with dampers.

Application to 4-6-2 type steam locomotives.

Trailing carrying wheels and trucks under steam locomotives usually have considerable side play to allow the locomotive to negotiate curves, but to prevent hunting on the straight sections, they are fitted with gravity or spring self-centering gear. When springs are used, they interfere with the way the bogie takes curves and increase the lateral thrust. When gravity is used, the balancing of the locomotive weight is altered and the bogie, which is often carrying the maximum load allowed, is increasingly liable to overheating.

The hydraulic damper appears to meet such a case admirably; it does not interfere with the way the engine runs into the curve, when the movement of the truck is relatively slow, and once the engine is on the curve it sets up no side actions. On the straight, as on curves, it opposes any violent side jars at the back end of the locomotive and keeps the engine straight when running.

The carrying pair of wheels of the Paris-Orléans locomotives 3 700 (231.700) has a side play of 45 mm. (1 3/4 in.) without any self-centering device. The draw- and buffer gear consists of a spring-fitted screw coupling, and dead buffers. The hunting of the back end of the locomotive sets in motion considerable masses, and the motion interferes with the driver, besides being destructive as regards the track. We fitted two 100-mm. (3 15/16 in.) diameter hydraulic dampers between the trailing axle and the locomotive frame as shown in figure 8, to damp out the hunting.

The first trials just completed showed that side movements were completely stopped, the fireman being able to work much more easily and with less fatigue.

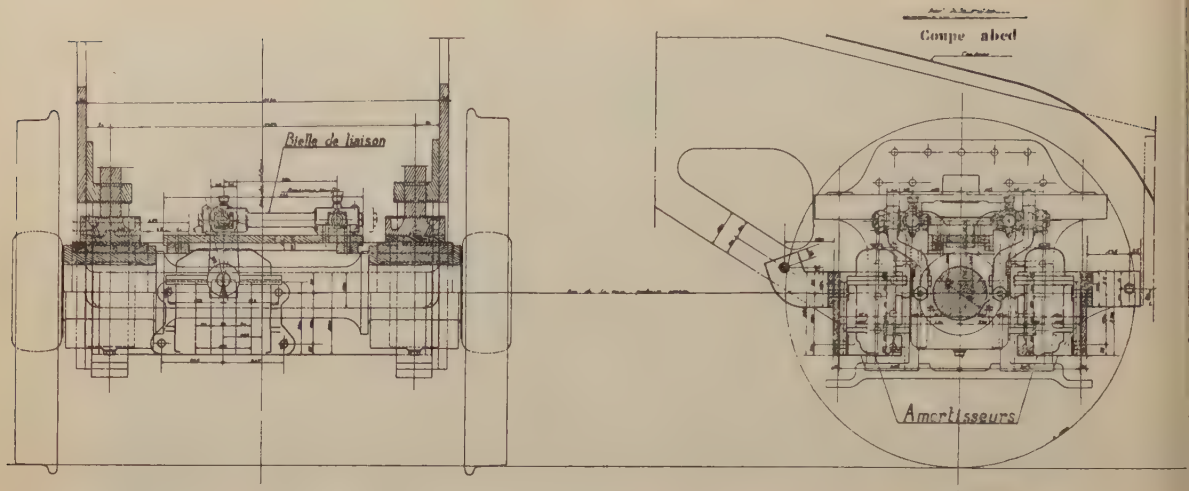
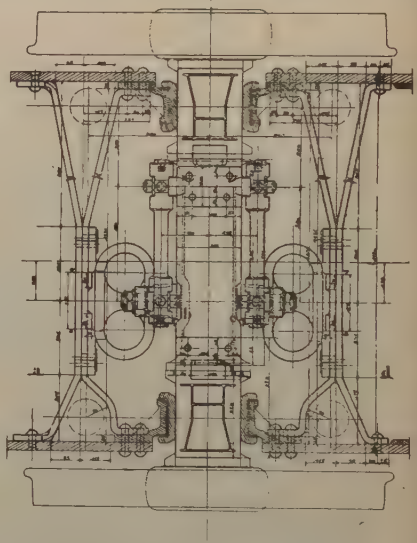


Fig. 8. — Dampers as fitted on leading carrying axle of steam locomotive 231.710.

Note: Bielle de liaison = Connecting lever.
Amortisseurs = Shock absorbers.



Application to $2D_02$ and $2C_0C_02$ electric locomotives.

The P. O.-Midi Railways are now fitting oil dampers to the bogies of the $2D_02$ electric locomotives (fig. 9) and to the trucks of the $2C_0C_02$ gearless E 601 electric locomotive (fig. 10).

II. — Suspension of other vehicles.

Oil dampers have also been fitted to various vehicles to damp out resonance movements. We began by fitting 72-mm. (2 53/64 in.) Broulhiet dampers, giving a force of 570 kgr. (1 255 lb.) at the end of a lever 250-mm. (9 7/8 in.) long, to the following stock :

1. Syf 11 service coach;
2. Electric motor coach ZACEyf 23014.

The results were excellent at all speeds in the case of the service vehicle, and at the maximum speed of 90 km. (56 miles) an hour with the motor coach, so much so that we intend raising the maximum speed to 105 km. (65 miles) an hour by changing the gears.

Figures 11 and 12 show the way the dampers were fitted.

Finally in order to evolve a suspension gear thoroughly satisfactory at very high speeds, we will carry out tests in the near future using 64-mm. (2 1/2 in.) diameter Broulhiet dampers, giving a

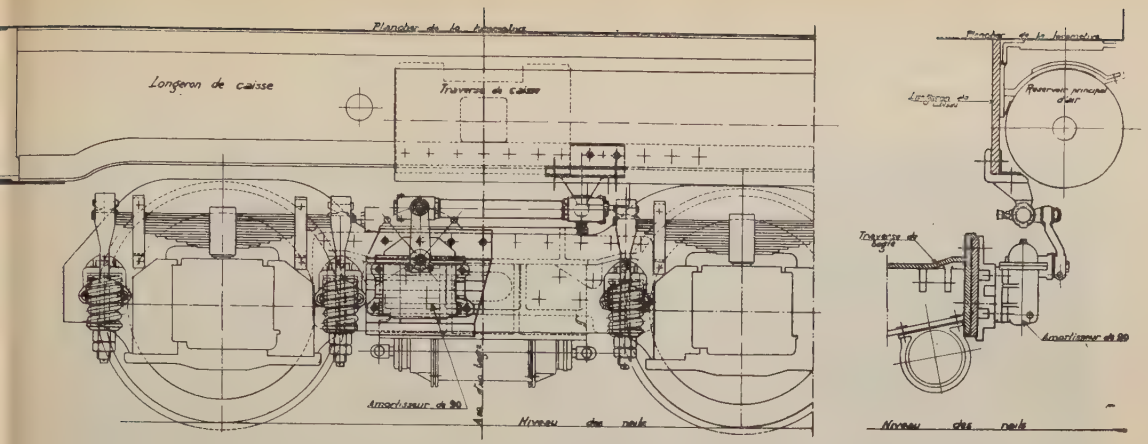


Fig. 9. — Dampers as fitted to the carrying bogies of a 2-D_0-2 high-speed class E Midi locomotive (No. 4800).

Explanation of French terms:

Amortisseur = damper. — Axe d'un bogie = bogie centre. — Longeron de caisse = body longitudinal. — Niveau des rails = rail level. — Plancher de la locomotive = locomotive floor. — Réservoir principal d'air = compressed air main reservoir. — Traverse de bogie = bogie bolster. — Traverse de caisse = body bolster.

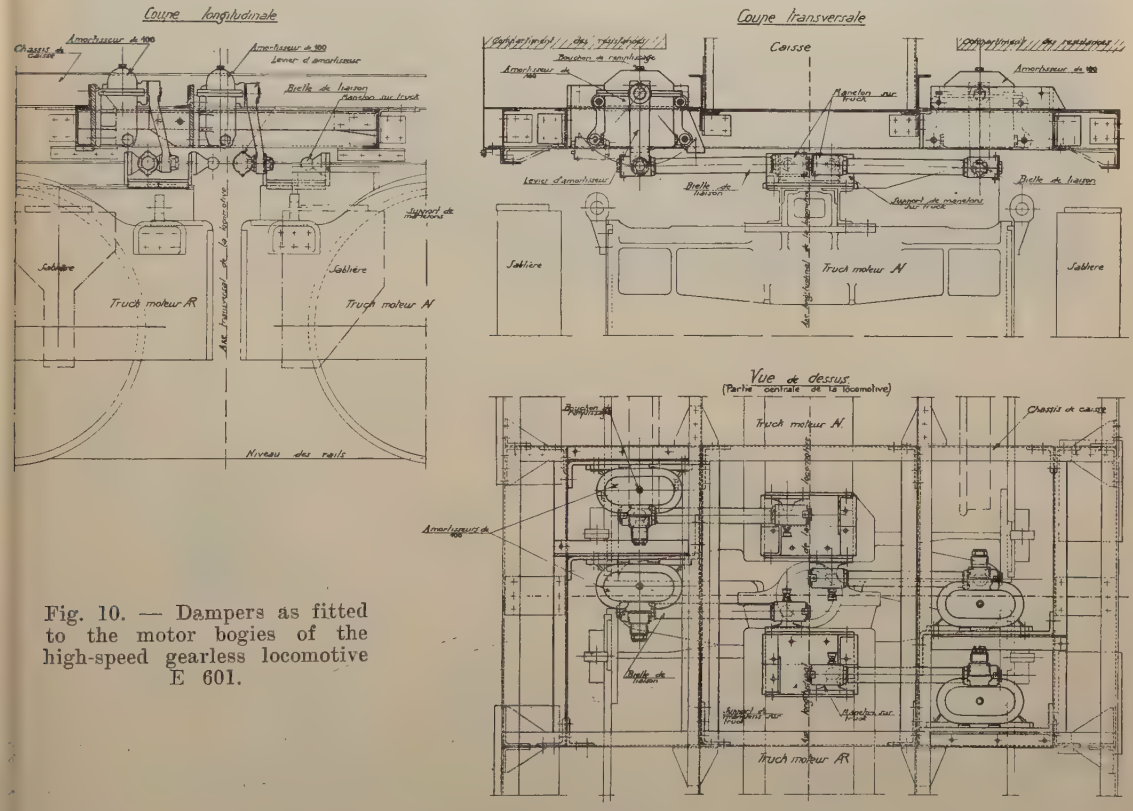


Fig. 10. — Dampers as fitted to the motor bogies of the high-speed gearless locomotive E 601.

Explanation of French terms:

Bielle de liaison = connecting lever. — Châssis de caisse = body underframe. — Coupe longitudinale = longitudinal section. — Levier d'amortisseur = damper lever. — Maneton sur truck = knuckle pin on truck. — Sablière = sandbox. — Support de maneton = knuckle pin bracket. — Truck moteur AV (AR) = leading (trailing) motor truck.

Axe longitudinal... = locomotive longitudinal centre line. — Bouchon de remplissage = filler cap. — Compartiment des résistances = housing of resistances. — Coupe transversale = cross section. — Partie centrale... = center part of locomotive. — Vue de dessus = top view.

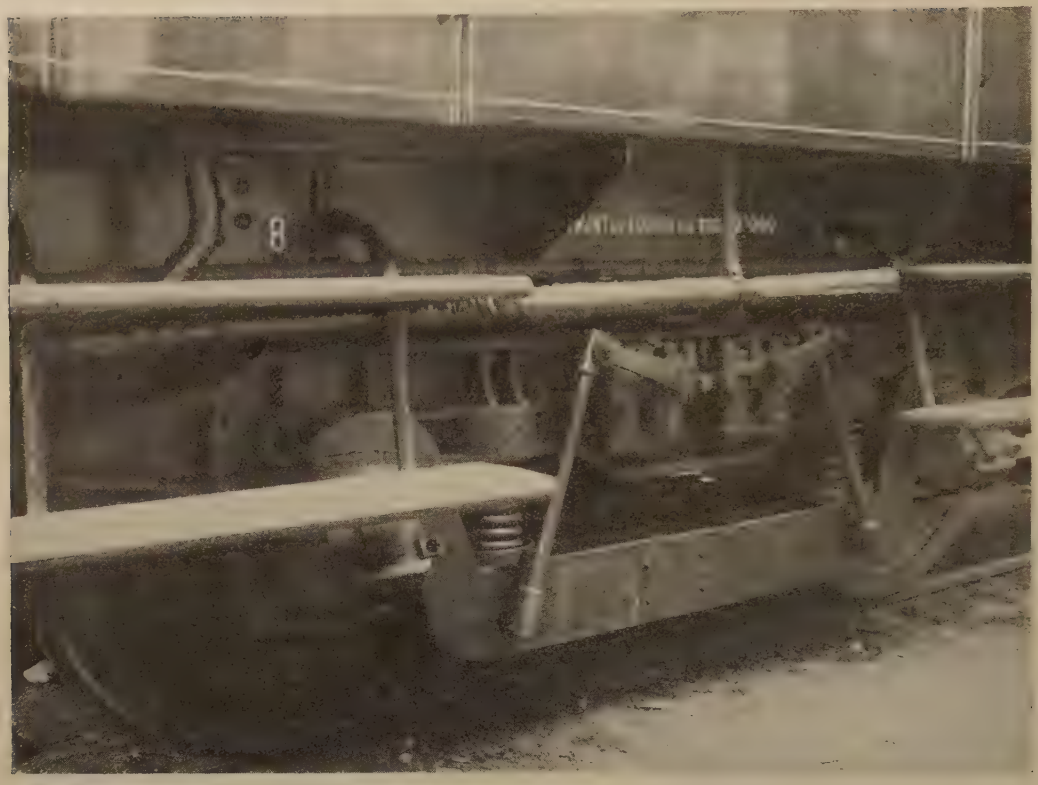


Fig. 11. — Dampers as fitted to Syf 11 carriage.

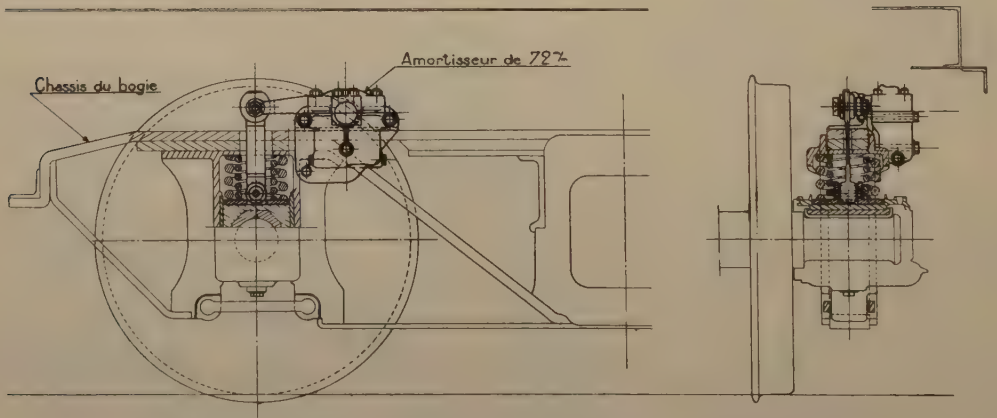


Fig. 12. — Dampers as fitted to rail motor car ZACEyf 23014.

Note: Châssis du bogie = bogie frame.

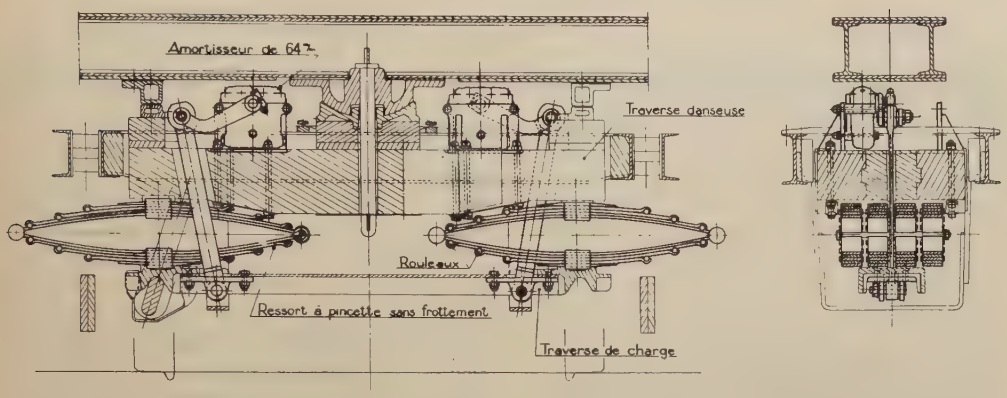


Fig. 13. — Dampers and frictionless springs as fitted to a C⁶yfi carriage.

Explanation of French terms:
Rouleaux = rollers. — Ressort à pincettes... = frictionless elliptical spring. — Traverse de charge = bottom bolster. — Traverse danseuse = bogie bolster.

force of 400 kgr. (880 lb.) at the end of a 250-mm. (9 7/8 in.) lever in conjunction with frictionless laminated springs, the plates being separated by rollers.

Figure 13 shows the trial arrangement as fitted to a C⁶yfi Paris-Orléans coach.

Conclusions.

Hydraulic dampers, so far only used on road motor vehicles, appear to have a wide field of application in railway work, both to prevent hunting and improve the suspension gear.

Each problem requires its own solution. To judge by the many successful trials carried out on the P. O.-Midi Railways, the chief of which we have described, it will be found possible, in our opinion, to tackle in a successful way practically all problems involving the damping out of parasitic oscillations in railway vehicles, by using a shock absorber which can be adjusted to suit the vehicle speed.

Paris, 4th December 1935.

[656. (4)]

A comparative study of motor transport regulation,

*(Third article *),*

by VLADIMIR IBL,
Engineer, Manager of Road Services, Czechoslovak State.

Bulgaria has now joined the countries wherein motor transport is regulated by law. We must therefore deal with this country in the present article and make the necessary amendments in the Supplement to the list of legislative or administrative provisions published at the beginning of the second article in this series.

In addition, the new regulations recently passed in France must be noted.

* * *

List of the legislative or administrative provisions regulating road motor transport in the different European countries.

(Second supplement).

Bulgaria.

1. The motor transport regulations are included in the *law of the 23rd April 1935 on the organisation of road motor services*. This law only applies to professional transport on which it imposes a system of concessions as well as a certain number of safety regulations.

France.

Addition to point 1.

Based on the decree of the 19th April 1934, a new *decree dated the 30th October 1935*, dealing with infringements of the regulations on co-ordination of transport, completes the decrees of the 25th February 1935 and 13th July 1935, by allowing the authorities to temporarily take out of service vehicles which have been used to break the law.

The decree of the 13th July 1935 quoted above lays down a system of *duties* on road goods services parallel to railway services, which will continue to be operated, according to the traffic distribution scheme. This decree is based on the *law of the 10th July 1935 on co-ordination of public goods transport services*.

A *decree of the 9th July 1935* sets up a « *Higher Transport Co-ordination Committee* » to prepare a reasoned transport policy and examine in this connection questions outside the duties of the co-ordination committees already formed.

* * *

The following text is to be added as *new point 4* :

The regulations covered by point 1, formerly only applicable to professional carriers, are now extended to private motor transport by the *decree of the 30th*

(*) See *Bulletin of the Railway Congress*, May 1935, pp. 544 to 556, and February 1936, pp. 130 to 149.

October 1935 which made it necessary to obtain licences for private goods transport, the essential object of this decree being to impose duties on vehicles used for such transport over long distances. (These duties are similar to those, mentioned earlier, imposed on lorries used for public services).

* * *

CHAPTER TWO.

II.

Let us now see if the special regulations on public passenger and goods services only affect *regular services* with fixed routes and timetables, or *occasional transport* as well.

Most regulations, with reason, make a distinction between these two classes of transport. Regular transport is, as a rule, dealt with more strictly, not only because it causes greater wear and tear of the public highways, and also because it seems at first sight to do the railway more harm than other forms of road transport — which is not always true, particularly in the case of goods transport, the greater part of which is worked as occasional transport — but also because the public who has to rely upon the regularity of such services, has to be protected against the interference with its habits any failure in such services would cause.

As far as the idea expressed by *regular* service is concerned, the following distinctions must be kept in mind :

Normally these are services with fixed routes and timetables. But whereas every service whose timetable is really fixed must of necessity have a fixed itinerary, there can be services over fixed routes without fixed timetables, worked according to traffic requirements. It would seem, therefore, that the normal definition of *regular services* should always link up these two criterions : fixed route, and fixed timetable. Most of the public omnibus services comply with this definite and clear definition. These services print and issue as posters timetables similar to those of the railways. Certain codes of regulations explicitly require this to be done.

In practice, however, between such services and definitely occasional transport worked on demand, there is an intermediate kind of transport in which one or other of the above two criterions is complied with either incompletely or to a different extent. For example, a weekly lorry service running on more or less the same days of the week between two fixed terminal points on a slightly varying route and so serving different intermediate points is not a regular service according to the strict definition given above, but does it not provide the equivalent of such a service in the opinion of those using it? The more lorries are found between the two terminal points, whether they belong to one or several contractors, the more does a service of such kind take on the aspect of a definitely regular service. Such collective services can take away from the railway much more traffic than any single duly authorised service over a fixed route, to fixed times. Another example : An omnibus owner who for some reason has not applied for a licence to operate a service with a fixed itinerary and times, endeavours to make use of his vehicle in addition to the duly authorised services. He runs his vehicle in the gaps in the timings of the authorised service or else a few minutes in advance, thus skimming the best of the legal concession holder's

traffic. Such parasitic services which are occasional from the point of view of time and route, the more so that they are liable to prosecution, evade practically all regulations or at any rate those affecting regular services, and they also escape the fiscal obligations imposed on the recognised regular services against which they can, therefore, compete more easily. The public, tempted by the lower fares, put up with approximate times for starting and arriving, and do not insist on the timings being published and posted up. It even helps such parasitic services on occasion by testifying in favour of their organiser if he is prosecuted and has to prove that he only runs services on demand.

The result is that, in order to be effective, the regulations have to give a rather general and flexible definition of regular transport and a very restrictive one of occasional transport.

We will endeavour to show the bearing of the regulations examined in this connection.

1. Germany.

The *special German regulations of the 4th December 1934* (point 1, page 544) which only deal with public passenger transport services, make a distinction in paragraph 2 between *omnibus services with fixed routes* and *occasional transport*. Further on, in paragraph 4, it defines services over fixed routes as those worked for two consecutive months of the year more than twice a week between two given places. It should be remembered that the decree of the 6th October 1931 (point 1, p. 544) which has been replaced in the case of passenger services by the above regulations, only dealt with regular transport which it defined as that worked for longer periods, and so organised that the public could adapt themselves to its arrangements.

In the case of *goods transport* this decree, which still covered such services until the 31st March 1936, makes no distinction between regular and occasional transport. This also applies to the new law of the 26th June 1935 (see addition to point 1, p. 130) which regulates such services after that date.

2. Austria.

The *special Austrian law of the 3rd October 1931* (point 1, p. 545) only covers, as its heading implies, road services with fixed timetables and routes, i.e. *regular services* which it defines as follows :

> A regular service is a public service by omnibus or lorry which is repeated and is organised outside the limits of a town or borough between two given places.

The *decree of the 31st March 1931* (point 3, p. 545) dealing with public goods transport services makes no distinction between regular and occasional services.

3. Belgium.

The *special Belgian law of the 21st March 1932* (point 1, p. 546) only deals with *passenger transport* over fixed routes between localities or places named by the operator, in accordance with clause 1 of the law. According to this same clause, the service need not be worked to a fixed published timetable, as to the phrase quoted above is added the words : even if the starting times are not announced, or if the services are not worked on the days and at the times announced. It would seem therefore that occasional services over fixed routes come within the scope of this law.

However, according to the decree of the 17th May 1932 on the licences required for starting the above-mentioned services (point 1, p. 546) applications for licences to start such services must state, amongst other things, the probable times and days on which it is proposed to work the service.

The *standard specifications* given in this decree stipulate that the authorised service is to include a given number of journeys in each direction on week days, as well as a given number on Sundays and holidays, and that the routes, starting and arrival times, and the stopping places are to be decided by the authorities issuing the licence.

It would seem therefore that in practice the Belgian regulations only apply to *regular* services properly speaking.

4. France.

As far as passenger transport is concerned, the *decree of the 19th April 1934* (point 1, p. 547) does not cover exceptional services, that is to say *special services intended to meet requirements which do not occur regularly.*

The *regulations dated the 25th February 1935* (see Supplement to point 1, p. 133) says : « Daily or periodical excursion services, as well as periodical services in connection with holidays, fairs and markets constitute regular services ». This definition was framed with a view to concluding agreements between the operators of such services and the railway, and considerably enlarges the idea of regular services.

As regards *occasional passenger transport,* the *decree of the 19th April 1934* does not mention this explicitely, but the decree of the *25th February 1935* brings it within the regulations by laying down in precise terms that it applies to the tourist services, excursions, or pilgrimages which « although made on demand meet public requirements which occur regularly during a part of the year and are not exceptional services », so that such services are more clearly defined than by the decree of the 19th April 1934.

It should be noted, however, that the *law of the 19th April 1934* (point 1, p. 547) laying down the terms of the statement that has to be made by operators, explicitely mentions occasional services, both passenger and goods.

The *decree of the 13th July 1935* (see Supplement, point 1, p. 143) co-ordinating goods transport, makes no definite distinction between services according to their regularity, but in the list of the different kinds of such transport given in clause 8 mentions also the class of *general regular services* which are defined as follows :

> Those services are to be considered as « regular public goods services » which are offered to the public at intervals previously determined, and at least once a week, over given routes between given centres.

In the subdivision of such services in the same clause, this definition is extended in the sense that the character of regular service remains ascribed to collection and delivery services organised in collaboration with the railway *regularly over specified routes,* or *optionally serving given places* as feeder services to and from the railway.

Apart from the cartage services, the same clause also covers special services handling livestock, liquids in tanks, and household removals. Other transport not coming under any of the above mentioned classes is defined as transport on demand, whether it is a question of transport in bulk or detail.

5. Hungary.

The *special Hungarian law No. XVI of 1930* (point 1, p. 549) covers both regular and occasional services. This law, however, in the case of passenger transport only applies to omnibus services. It defines as *regular* such services as are worked on the initiative of their contractors for a certain length of time, with a certain degree of regularity, between two places so that the public can consider them as regular.

Occasional goods transport worked by contractors as cartage agents does not come under this law.

6. Italy.

The fact that, when applying for a concession, a description of the route and timetable that will be followed by the public service, whether permanent or periodical, must be produced according to clause 31 of decree *No. 701 of the 29th July 1909* (point 1, p. 550) proves that the special Italian legislation only covers *services with fixed routes and timetables*. It would appear that *occasional* transport is not subject to any special regulations.

The new Italian *law No. 1349 of the 20th June 1935* on the regulation of motor goods transport (see Supplement, p. 135) divides the public services into services worked by vehicles standing for hire (servizi di piazza) and regular line services (servizi pubblici di linea). In this law only regular services are definitely defined, in the following words :

> Those services are considered as regular, which are worked over the same route according to a fixed timetable on behalf on a third party on payment of the fixed rates, with the obligation to deliver the goods within a fixed period and stop at places laid down in advance to pick up and deliver goods. These services must be available to anyone.

7. Poland.

The *special Polish law of the 14th March 1932* (point 1, p. 552) makes no explicit mention of regular or periodical transport, but amongst the kinds of transport not covered by this law is mentioned the *occasional transport* of passengers in vehicles hired as a whole, and the *order putting the decree into force, dated the 6th July 1932* (point 1, p. 552), defines the idea of occasional transport as follows, thus at the same time defining regular transport indirectly :

> That transport is to be considered as occasional which is not worked regularly between two given places or at fixed intervals.

8. Rumania.

The Rumanian legislation makes no distinction between regular and occasional transport. The standard specifications (point 1, p. 553) moreover only apply to regular passenger services.

9. Switzerland.

The monopoly granted to the Post Office Administration by the *law of the 2nd October 1934* (point 1, pp. 553/554) only includes regular passenger transport, without any definition of such services.

The proposed Federal law to regulate the transport of goods and livestock on the public highways in motor vehicles (see Supplement, point 5, p. 136) covers both regular and occasional transport, but its wording makes no material distinction between these two kinds of transport.

10. Czechoslovakia.

The *special Czechoslovak law of the 12th April 1935* (see Supplement, point 1, p. 136) makes a clear distinction between regular and occasional transport, both passenger and goods. Both classes of transport require concessions, which apart from certain special requirements for regular services, are the same. Regular transport is defined as follows : Those services are to be considered as *regular* which are so organised from the point of view of the times at which they are run and the places which they serve that they can be relied upon to be repeated. All other services are occasional. From this definition a passenger service which takes place, for example, every other day at approximately the same time, whether worked by motorbus, motor car, or taxi, is a regular service just as much as a motorbus service worked several dozen times a day according to a fixed and published timetable. In both cases the timetable must be submitted to the competent authorities for approval. If anyone organises regular services of any kind he must operate them without interruption to the approved timetable, unless this is impossible from force of circumstances.

The authors of the above law, however, recognised that the definition given is not sufficiently precise and would lend itself to misinterpretation. Consequently, the clause containing the said definition reserves to the Ministry of Commerce and the Ministry of Railways the task of drafting instructions for the guidance of the general administrative authorities, which will ensure a uniform interpretation as to whether the different services are regular or occasional.

11. Jugoslavia.

The *special Jugoslav law of the 12th December 1930* (point 1, p. 555) which, according to its title, should deal with regular transport and certain kinds of occasional transport, defined *regular transport* as « that worked to a fixed timetable ». It also covered occasional transport « worked over a given route ».

The *general companies law of 1931* (see point 1, p. 555) only applies to regular passenger and goods transport, whereas the *decree of the 10th May* (point 2, p. 204) only concerns *occasional* goods transport, neither enactment giving a precise definition of these two kinds of transport.

However, the *Regulations on the transport of passengers and goods by road motor vehicle, of the 16th May 1935* (see Supplement, point 1, p. 137) clearly defines regular transport as follows :

> That passenger transport is to be considered as *regular* which is operated as a public service professionally. Regular passenger services must first of all have their timetables and rates approved. Tourist services worked over a route determined in advance according to uniform rates are also to be considered as regular services.

Against this, the regulations also give a definition of transport which is *not to be considered as regular*, the following paragraph of which should be noted :

That transport is *not to be considered as regular* which is worked to order, by hiring the vehicle as a whole, on definite occasions, if such transport has no permanent or regular character. Neither is transport worked irregularly by means of motor taxicabs with no fixed routes to be considered as regular.

In the case of *goods transport*, the regulations define as *regular* all transport

worked professionally according to an approved timetable, and even when there is no timetable, if it provides a permanent service between two places over the same route for a period of at least a month at least once a week. Any service worked on application without any special timetable, not covering any fixed route, is considered as occasional.

III.

Let us consider once more if and under what conditions the legislation of the different countries distinguishes between *permanent* and *temporary public* services, and what are the consequences of such a discrimination.

Certain regulations, especially in the case of passenger transport, draw a distinction between *permanent* services and *temporary* services, and deal less stringently with the latter.

In the case of such regulations, the situation can be taken to be as follows :

Germany, Austria, Hungary, Poland, Rumania, Switzerland, Czechoslovakia, and Jugoslavia. — No distinction is made.

Nonetheless they do not exempt temporary services from their scope, seeing that services with fixed timetables and routes can be temporary (seasonal, for example) as well as permanent.

In certain countries the definition of *regular* services includes the condition that such services shall be worked during a minimum period (for example for two or three months of the year), which covers the idea of temporary services. This is the case in *Germany* where the law of the 4th December 1934 considers a service as regular if it is worked at least twice a week between two given points for a period of two months in succession.

In *Austria*, the special law of the 3rd October 1931 defines, in clause 1, the idea of « periodical transport » also for a minimum period of four weeks.

In *France*, the road services which are the subject of co-ordination in the case of passenger transport, although not explicitely indicated in the decrees in question, certainly include some temporary services. The public administrative regulations of the 25th February 1935 state that tourist services, etc., which, although worked to demand, meet public requirements and occur regularly during part of each year, are covered by the co-ordination policy. Services with fixed routes and timetables worked, for example, only during the Summer, seem to be covered thereby with even greater reason.

The special *Belgian* law of the 21st March 1932 (point 1, p. 546) explicitely mentions temporary and permanent motorbus and motorcar services, and in the same clause defines temporary services as follows :

> The service is to be considered as temporary when organised for a maximum period of three months.

The *Italian* regulations recognise three classes of *temporary* passenger services : *provisional*, for a period of six months; *seasonal*, worked during a season for a more or less short period; and *long-distance tourist services*, luxury travel, likewise seasonal in character.

IV.

We must now deal with the *distinction between kinds* of public *transport according to their field of action.*

From this aspect, the situation is as follows :

Germany.

The *law of the 4th December 1934* regulating public passenger transport

would not seem to exclude transport within local areas; this follows from paragraph 3, which defines the tramways coming under the regulations, whether giving a service within a locality or between two neighbouring places. By analogy, motorbus services and also work done by taxis within a district will come under these regulations, the more especially as the latter regulations have replaced the ordinance of the *6th October 1931* and only deal with inter-urban transport, and in clause 45 explicitely state that the provisions of this order are abrogated.

On the other hand, the decree of the 6th October 1931, which still regulates public goods transport, and the law of the 26th June 1935 which covers it since the 1st April 1936 excludes local transport.

Austria.

The *special law of the 3rd October 1931* excludes from its scope public passenger services worked within the limits of a town or borough.

Decree No. 109 of the 31st March 1931 (point 3, p. 545) on the transport of goods likewise excludes transport within a locality.

Belgium.

The *law of the 21st March 1932* also covers public motorbus services organised within a locality, without making any special distinction in their case. In its general effects this law excludes local trips made by taxicabs.

France.

In conformity with clause 16 of the *decree of the 25th February 1935*, services within towns and their suburbs are excluded from the co-ordination of public passenger transport. In the case of goods transport, coming under the *decree of the 13th July 1935*, « cartage services » that is to say transport within the limits of towns and their suburbs, are dealt with very liberally and are practically unaffected by the co-ordination clauses of this decree.

Hungary.

According to law *No. XVI of 1930* (point 1, p. 594) which forms the special regulations on public passenger and goods services, regular motorbus services worked within the limits of a locality come under this law, but passenger transport worked inside towns by taxis as well as local cartage services by cartage agents are exempt. Such undertakings however are required to obtain a licence in accordance with the general law on professions, and *law XVI/1930* adding certain special provisions to these general regulations.

Italy.

The Italian regulations on passenger transport whilst ignoring transport worked in taxis within localities undoubtedly include within the special provisions on transport over fixed routes, transport of this kind within the limits of a locality (by virtue of the *decree of the 29th July 1909)*, although such transport is not specifically mentioned.

In the case of goods transport, *law No. 1349 of the 20th June* also covers local transport.

Poland.

The special regulations (law of the 14th March 1932) impose the obligation of obtaining a concession for carrying passengers and goods *beyond* the limits

of a locality, and contain special provisions as to the concessions required within the limits of a locality. The Minister of Public Works is authorised to permit localities wishing to extend the routes of their motorbus services to neighbouring places, to do so without a concession.

Rumania.

The law of the 11th June 1930 on the operation of public road services in Rumania stipulates that the State monopoly of public road transport services does not include the operation of transport by taxis within localities, which will be regulated separately in accordance with the law on road traffic. It is stipulated, in addition, that the organisation of public omnibus services within the limits of a town or borough is a monopoly of the locality which can grant a concession to work them.

Switzerland.

The regulation of public passenger transport in connection with the exclusive right of the Post Office Administration to organise such transport or concede their operation, does not cover transport within the limits of a locality.

Czechoslovakia.

The special regulations cover both passenger and goods public transport worked within the boundaries of a locality (commune). Only the public motorbus services operated by towns or boroughs receive preferential treatment in the sense that no concession is required for such services even if they run more than 5 km. (3 miles) outside the administrative boundaries of the locality, and a reduction in the tax on tickets sold is granted to services which do not exceed this 5-km. limit. They only enjoy such preferential treatment if they have come to an agreement with the railway administration.

Jugoslavia.

The *regulations* on passenger and goods transport, *of the 16th May 1935* (see Supplement, point 1, p. 137), also cover regular passenger services worked within the boundaries of a commune; this seems to apply solely to motorbus services, seeing that clause 2 excludes taxis from the *general law on transport undertakings* published on the 9th November 1931 (point 1, p. 555), according to which a concession is only necessary for regular transport services. As regards goods transport, occasional transport being for the same reason excluded from the scope of the above-quoted legislation, regular transport organised within the boundaries of a commune is not covered by this law as far as the necessity of obtaining a concession is concerned; however, it is laid down therein that the concession-holders of goods transport services can also work urban traffic on the basis of their concession, it being also laid down that, in the case of this town traffic, the restriction imposed on occasional transport that only complete loads can be carried does not apply.

V.

We will now see what distinction is made by the regulations considered as regards the *capacity of the vehicles* used for what is considered as public transport or worked professionally. It should be said at once that this distinction only applies to *passenger transport*.

Public passenger transport, especially services with fixed routes and timetables,

requires sufficiently large vehicles with enough seats for the passengers loaded at the start and picked up en route; in this they resemble tramways.

This kind of transport can be defined by the expression « transport in common ». The motorbus type of vehicle based on the horse-drawn omnibus has been developed for this kind of transport.

The idea of « transport in common » as just defined, also requires that the motor vehicle used for this kind of transport can easily pick up and set down passengers en route. Motor *charabancs*, though often having more seats than the motorbuses generally used, and being comfortable for journeys from end to end, are not so suitable as the latter for « transport in common » properly speaking, as they are not so convenient when the passengers have to get in and out en route.

Charabancs and taxis offered for hire in public places, or vehicles hired from a garage owner for an occasional trip only differ in capacity. These two classes of vehicle are therefore preferred for occasional transport, while motorbuses are generally worked in services with fixed routes and timetables.

The provisions of the highway codes and those of the fiscal enactments generally divide motor passenger-carrying vehicles into two classes : *heavy* and *light*. The distinction between these two classes is governed either by the dead weight of the vehicle or by the number of seats provided for passengers, in addition to the driver's seat. In certain cases a further distinction is made between motorbuses and motor-charabancs, according to their tare.

The regulations on motor passenger transport have often used the above distinction according to the number of seats. The limit between the two classes separates the vehicles considered as intended for transport « in common » from those used for other kinds of transport (of a more individual nature). This is an arbitrary limit, varying for example from 3 to 7 seats.

Transport « in common » is generally under more stringent regulations than transport worked in smaller-capacity vehicles with no more seats than the number given above.

a) Transport « in common » of passengers.

1. Germany.

Paragraph 2 of the *special law of the 4th December 1934* (point 1, p. 544) makes a distinction between *motorbus services over fixed routes* and *occasional journeys by motor vehicles*.

In the case of occasional journeys, this law stipulates that « the licence for vehicles plying for hire in public places, with not more than 8 seats, including the driver's seat (taxis) is issued by the police authorities of the district in which the owner's offices are located », whilst in the case of other kinds of occasional passenger transport the *higher* authorities grant the licence to the operator.

The special German legislation therefore makes a distinction between transport « in common » and other public transport, and has special regulations for the latter.

The order putting into force the law on motor traffic of the *10th May 1932* (point 2, p. 544) gives a clear definition of what is to be understood by « motorbus ». According to this decree those vehicles are to be considered as « motorbuses » which are used for the transport of passengers and have more than 8 seats, including the driver's seat ».

This agrees with what has just been stated.

2. Austria.

The *special Austrian law of the 3rd October 1931* (point 1, p. 545) makes a licence necessary for motorbuses as for all other vehicles used for services over fixed routes with published timetables, in which the seats are booked separately. The ordinance of the *12th May 1930* (point 5, p. 545) on motor vehicle traffic defines as « motorbus » any motor vehicle used for the transport of passengers with more than 8 seats, including the driver's seat.

3. Belgium.

The enactments which regulate passenger transport (points 1 and 3, p. 546) only relate to public motorbus and charabanc services. Other public passenger transport (as by taxis) is excluded from the Belgian regulations, which consequently only affect transport « in common ». The *royal decree of the 25th January 1935* (see Supplement, point 1, p. 133) regulating the taxes on motor vehicles clearly defines the idea of « transport in common » for this kind of transport.

4. France.

The *decree of the 25th February 1935* giving the administrative regulations in connection with co-ordination of passenger transport clearly lays down that « passenger transport worked by means of vehicles on hire, especially so-called « private hire », or « taxis », on the express condition that they are hired out as a whole and without intermediary, does not come under the regulations based on the decree of the *19th April 1934* » (point 1, p. 547).

The special French regulations consequently only cover the transport of passengers « in common »; other kinds of transport are excluded.

The General Regulations on road traffic, introduced by the decree of the *31st December 1922* and amended by several subsequent decrees (point 2, p. 540), included special regulations for motor vehicles used in *public transport in common*, and obviously only dealt with passenger services, i.e. motorbus and charabanc services.

5. Hungary.

According to the *special Hungarian law No. XVI of 1930* (point 1, p. 549) the regulation of passenger transport would only seem to cover regular or occasional passenger transport by motorbuses. This law excludes from its *general* scope, with the exception of certain clauses, transport by means of vehicles offered for hire (also plying for hire in public places) on condition that they are hired out as a whole.

6. Italy.

The regulations on public motor services (see point 1, p. 550) only affects services over fixed routes, and decree *No. 705 of the 7th May 1922* (point 2, p. 550) lays down that taxis do not come under the regulations about concessions prescribed for the above-mentioned kinds of services.

It can therefore be said that only transport in common is covered by the special Italian regulations.

7. Poland.

The *special Polish law of the 14th March 1932* (point 1, p. 552) makes no formal distinction between transport « in

common » and other kinds of public passenger transport. However, this law excludes from the obligation of obtaining a licence occasional transport of passengers worked in vehicles hired out as a whole. The *ordinance of the 6th July 1932* (point 1, p. 552) on the application of the above law defines the idea of « hiring out as a whole » without saying anything precise on the capacity of the vehicles affected by this law.

The *law on the fund for the construction, maintenance, and improvement of the roads* (point 4, p. 552) fixing the contributions from (public) services worked for reward, makes a distinction, in the case of vehicles used for the *occasional* transport of passengers, between those with not more than 6 passenger seats and those with more. It opposes vehicles of this category to other vehicles used for public passenger transport (motorbuses and charabancs used for regular services with fixed routes and timetables). It would appear, therefore, that the first of these two categories includes for the most part taxis but also, for example, motor-charabancs used solely for excursions, etc.

8. Rumania.

The *Rumanian law of the 15th October 1932 on the operation of public road services by means of motor vehicles* (point 1, p. 553) lays down that « the State monopoly does not include the operation of transport in motor-taxis in towns. Inter-town transport worked by means of taxis is covered by this law.

The Rumanian legislation consequently seems to make no distinction between passenger transport « in common » and other kinds.

9. Switzerland.

As far as Swiss legislation is concerned, *the order putting into force the federal law of the 15th March 1932* on motor vehicle and cycle traffic (point 3, p. 554) gives, in addition to a distinction between heavy and light types of motor vehicles, a definition of *motor-charabancs* (motorbuses) in these words : « Charabancs are motor vehicles with more than 8 seats, used for the transport of passengers.

However the transport of passengers by means of *regular* services is reserved for the Post Office Administration or its concession-holders in accordance with the *Federal Law on the Post Office services of the 2nd October 1934* (point 1, p. 553). This law does not recognise, even in the case of services worked by concession-holders, services worked by means of vehicles other than charabancs, and these services seem to lie outside the scope of the special legislation on public motor transport. Taxis would therefore be treated like vehicles for private use.

10. Czechoslovakia.

The *special Czechoslovak law of the 12th April 1935* (see Supplement, point 1, p. 136) makes a distinction between transport « in common » and other public passenger transport, none of which is excluded from its scope. It defines as transport « in common » transport worked by means of motorbuses, the term « motorbuses » being clearly defined by the licensing regulations which give as the criterion of transport « in common » passenger vehicles with a capacity of more than 8 seats including the driver's. The duties for transport « in common » fixed by this law in the form of a tax based on the number of tickets sold do

not apply to other public passenger services.

11. Jugoslavia.

The *special Jugoslav law of the 12th December 1930* repeated in the *general law on undertakings* only deals with passenger transport, making no distinction according to the capacity of the vehicles used, and the law of the *20th February 1934* (point 3, p. 556) introducing new transport taxes only applies to motorbus services.

The *regulations* (see Supplement point 1, p. 137) on motor passenger and goods transport containing more precise definitions and detailed regulations based on the general law on transport undertakings, explicitely excludes taxis.

b) Private-hire vehicles (motor taxicabs).

To bring out more clearly the character of transport « in common », we think it as well to complete the above report by a brief description of the legal position in various countries as regards vehicles for hire, or taxis, as far as these have been covered by the legislation in force.

This class of public transport, which at the beginning was confined to town limits, now plays an important part in services between towns in certain countries.

To define this category of vehicle, the regulations are based on the one hand on the limited *capacity* of such vehicles, and on the other hand, on their *special utilisation*, as we shall bee below.

1. The *German* regulations (law of the 4th December 1934) give no *direct* definition of taxis but includes them among vehicles used for occasional passenger transport; but this same law mentions them when defining as occasional services those worked by means of vehicles offered for hire in public places.

Taxis are covered by the essential clauses of this law. A licence is required by the firm operating such services, such a licence dealing with the number, type and quality of the vehicles employed.

On the other hand, according to the same law, the fares and conditions of transport, and if need be the timetables, are to be fixed and published by the authority granting the licence. The operator is obliged to charge the transport rates in a uniform manner, and is forbidden to grant reduced rates other than those which under the same conditions are available to anyone.

2. The *Belgian* regulations (*law of the 21st March 1932,* point 1, p. 546) indirectly exclude taxis from their scope, seeing that they only deal with public motorbus and motor-charabanc services. The royal decree of the 25th January 1935 on the legal requirements as regards taxes on motor vehicles, makes a clear distinction on the one hand between motorbuses and charabancs, and on the other hand between taxis and vehicles hired out for a single errand or journey.

3. In *France,* the special regulations exclude taxis on condition that such vehicles are hired out *as a whole* and *not through a third party.*

4. The special *Hungarian* regulations (law no XVI/1930) exclude from their general scope « undertakings which operate for reward passenger services without special itineraries fixed in advance, by putting their vehicles at the disposal of the public, either at the firm's offices or in public places, on condition that such vehicles are *hired out as a whole* ».

Undertakings operating services worked by means of taxis are regulated by the

law on professional transport, with the following exceptions. Such undertakings form a professional calling subject to concession, and must be insured against the risks inherent in their operation. Vehicles plying for hire must be fitted with a taximeter and new vehicles of this kind must comply as regards dimensions, construction, and fitting out with such conditions as will be laid down in the interest of the public by the Minister of Commerce.

5. The special *Polish* regulations do not affect passenger transport worked by means of vehicles hired out as a whole, and the order enforcing the law, dated the 6th July 1933 (point 1, p. 554) defines the idea of hiring out as a whole as « putting the vehicle at the disposal of the customer who wishes to hire it for the transport he wants to carry out, and pays for the hire of the whole vehicle ».

6. In *Czechoslovakia*, the special regulations of the 12th April 1935 subject occasional transport (in which transport by means of taxis is included) to all its provisions with the exception of certain stricter regulations in the case of services with fixed routes and timetables.

7. In *Jugoslavia* the decree on the payment by road users of a contribution towards their maintenance, dated the 16th December 1930 (point 3, p. 556) mentions motor taxicabs belonging to small operators (chauffeurs) which, like private motor vehicles, are exempt from the tax.

The *Regulations of the 16th May 1935* by defining negatively transport with fixed routes and timetables, define transport worked by taxis as not bound to follow a fixed route nor to be worked regularly, but on occasion by hire or by agreement as wanted. (The same enactment mentions another category of transport which does not come under transport « in common », which it describes as transport worked by means of the hiring out of complete vehicles, as required, without such journeys taking on the character of permanent and regular services).

* * *

We will now try to sum up, as in the case of the first part of the present chapter, the other parts of the same chapter classifying as far as possible the multiple and complex matters we have dealt with.

A. — Criterion of the regularity and periodicity of transport.

I. — *Passenger transport.*

a) In Austria, Belgium, Italy, Switzerland, and to all intents and purposes in Rumania, the legislation deals *solely* with *regular* services.

b) In countries other than those mentioned under (*a*) the legislation makes a *clear distinction* between regular services and occasional transport (except in Poland), and in most cases each of these two categories of transport is treated somewhat differently.

c) The *definition of regular passenger services* lays down the condition :

1. That the services shall follow a route (itinerary) (*i*) and be worked to a timetable (*h*) and apply tariffs (*t*) fixed and known in advance :

In Germany (*i*), Austria (*i*), Belgium (*i*), France (*i*), Hungary (*i*), Italy (*i, h*), Poland (*i*) and Jugoslavia (*i, h, t*).

In some of the above examples the idea of « fixed route » is replaced by

that of a service linking up two given points. It should be noted that the above indications only take into account definitions explicitely given in the different regulations, without regard to the material requirements which sometimes add one or other of the above criterions.

2. That the services shall be worked as permanent services (*p*) or without interruption for a given period of time (*d*), and if need be at minimum intervals (*f*) in a given period (for example in a week) :

In Germany (*d, f*), Austria (*d, f*) and Hungary (*d*).

The Italian regulations make a distinction between permanent and temporary services.

The definition of regular services includes on the other hand (or in addition) the idea :

3. That the transport shall be continually repeated, or that the public can count upon its being repeated :

In France, Hungary, and Czechoslovakia.

II. — *Goods transport.*

In the case of goods transport the situation is as follows :

a) There is no regulation of public goods transport in Belgium and Switzerland, nor practically speaking in Rumania.

b) None of the regulations in force in countries other than those mentioned under (*a*) are limited to regular goods transport services alone.

c) In the regulations in force in countries other than those mentioned under (*a*) a clear distinction between regular services and occasional transport is only made in France, Hungary, Poland, Czechoslovakia and Jugoslavia.

d) As for the definition of regular goods transport, this is based on the conditions laid down for regular passenger services given above.

B. — Criterion of the radius of action of transport services.

1. Transport within commune (town) limits is excluded from the special regulations of the following countries in the case of passenger transport (*v*) or goods transport (*m*) :

In Germany (*m*), Austria (*v, m*), France (*v*), and practically also in Hungary (*m*), Poland (*v, m*), Rumania (*v, m*), Switzerland (*v*), and Jugoslavia (*v, m*).

It should be noted, on the one hand, that up to the present there has been no regulation of public goods transport in Switzerland, and on the other hand that in Hungary and Jugoslavia only transport in taxis is exempt from the regulations.

2. In countries other than those listed under (1), no distinction is made between town-to-town transport and local transport in the Belgian and Italian regulations. In the Czechoslovak regulations, such services receive different treatment — solely in the case of the regular motorbus services operated by communes within their territory.

C. — Criterion of the capacity of vehicles used for public transport.

(This only applies to passenger transport).

1. The special regulations of the following countries apply solely to passenger transport in common (motorbus or charabanc services) :

Belgium, France, Hungary, Italy, Poland, Switzerland, and Jugoslavia.

2. Among countries other than those

listed under (1), Austria and Rumania make no distinction in their special regulations between transport « in common » and transport worked by means of taxis (vehicles plying for hire or hired from the operator's office).

3. In the case of the other countries, a distinction is made between these two categories in Germany and Czechoslovakia, and in both these countries transport in common is subject to stricter regulations.

* * *

Conclusions of Chapter Two.

The analysis made in this chapter shows first of all that the regulations are not all equally *complete* when examined from all points of view. In other words, the regulations do not all apply to all known classes of public transport. Thus for example, it will be seen that regular transport services in taxis, very often paralleling the railway, covering long distances for which such vehicles are more suitable than omnibuses and charabancs which are subject to speed limits in certain countries, are a dangerous factor as regards competition against the railway, yet frequently escape all regulation. On the other hand, the regulations on goods transport by road is of little efficacy unless occasional transport by lorry is also brought under the regulations as this is by far more resorted to than purely regular services. In addition, firms working occasional goods transport services also carry, in an irregular and variable way, important traffic of a regular character, which it is very difficult to discriminate and bring under the regulations as regular transport. Competition against the railway caused by such operators of occasional goods transport is generally very important.

We have seen that the *nature of the definitions* given in the regulations examined differs a great deal, both from the point of view of precision and of their *strict interpretation,* and also that definitions of a given category of transport in different enactments have not always the *same object* and consequently not the same scope. The shades in the meaning of the different regulations have some drawback for those wishing to compare them in order to improve a given set of regulations. On the other hand, these differences encourage those who endeavour to lighten the regulations to the benefit of road transport, and they favour evasions of the present regulations.

Whether the railway administrations think they can preserve their systems solely by strict regulation of road transport, gradually adapting, of course, their methods of operation to the situation brought about by automobile traction, or they think it desirable to collaborate with road transport firms, it is nevertheless necessary to follow a clear and logical policy if the legislative authorities are to be influenced in the desired direction.

It would seem, therefore, that the Administrations would be well advised to make methodical comparisons of the existing regulations — as we have tried to do in this chapter — so as to draw therefrom new ideas on the subject and new arguments to use in their attempts to obtain the effective regulation of road transport, or in their attempts to co-ordinate rail and road transport.

Finally the International Railway Congress Association is, in our opinion, fulfilling its proper function in endeavouring to assist its member railways in this important task by the publication of this article.

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Railway Curves.

A new method of surveying lines on curves and of calculating the angle at the centre by means of the diagrams of the versines,

. by Mr. CHAPPELLET,
Divisional Inspector, Permanent Way Department, Nord Railway, France.

We dealt with the exact relationship between the versines of a curve and its ordinates in the February 1934 *Bulletin of the Railway Congress.*

This relationship, established for calculating the theoretical error inherent in the method of adjusting curves by correcting the versines, shows that such errors are negligible, as for example :

1/100th of a millimetre (1/2500th of an inch) in ordinary cases, and 1/5th of a millimetre (1/125th of an inch) when rectifying a sharp curve (300 m. = 15 chains radius) with displacements of 0.30 m. (12 inches).

The method described in the note in question, although apparently purely speculative, can be applied with advantage when surveying main lines laid on curves; the present article deals with an interesting application of the method.

* * *

A line laid on a curve of any shape can only be surveyed by pegging out the polygon enclosing the curve. This polygon is frequently difficult to set out and survey, especially if alongside a line in use or on a narrow formation limited by cut or fill where, if possible, it would be better not to try it. It can be used when the versines are known, with equally spaced pegs, as the ordinates can be calculated. Obviously with this data the centre line of the curve can be drawn accurately. Hence, the survey of the curves and the land immediately adjacent, when they have been pegged with a view to adjusting the curvature by correcting the versines, is reduced to surveying the transverse sections normal to the axis of the curve. The square can be set easily and quickly and the errors in reference marks, when the sections are measured by chaining, are avoided.

Then too, when the survey is being made to study alterations adjacent to the running lines as a result of an improved location, the centre of the corrected main line can be transferred accurately to the plan by marking off, in line with the pegs of the uncorrected curve, the displacements calculated by the method of adjusting by correcting the versines; the location of the connections between the main lines and the sidings are more easily selected when this method is followed.

This very simple method undoubtedly

saves much time. Now let us consider it in detail.

A circular curve AT (fig. 1) the ordinates of which at each equi-distant peg are known, is plotted by setting up at equal distances on the axis of the abscissæ AX the equi-distant ordinates 1 B, 2 C, 3 D, etc.

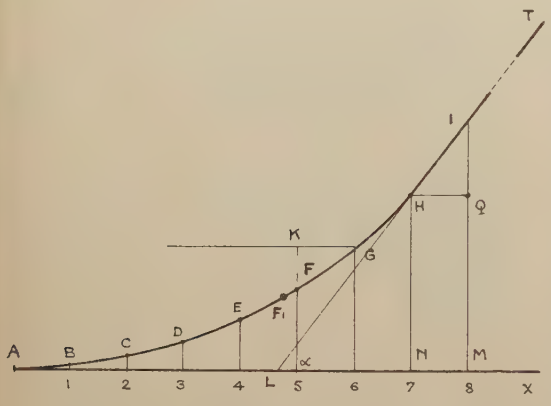


Fig. 1.

The arc A F, for example, so drawn, is not equal to 5 equal spaces, as this length falls at another point F_1. As soon as F F_1, reduced to the scale of the plan, reaches the limiting value resulting from the error admitted, for example 1/4 millimetre, the following point G is obtained by the intersection of K G, parallel to the abscissæ line at a distance 5 K equal to the ordinate of the point G and of the circular arc struck from the centre F_1 with a radius F_1 G equal to the equi-distance *d*. The other pegs of the curve : H I, etc. are marked off in the same way. As a check, the abscissæ A-6, A-7, to the same scale, ought to agree with the data in the tables of abscissæ and ordinates.

It is also easy to find the point beyond which the difference F F_1 becomes excessive.

In the case of a parabolic transition for example, the length S in terms of the end abscissa X, is given by the formula :

$$S = X + \frac{1}{10} \frac{X^5}{4^2 p^2 R^2} \cdots (1).$$

R being the radius of the circle into which the transition runs.

When X = 80 metres, p = 40 metres, R = 500 metres, S = 80.05 metres; in this case F F_1 = 80.05 — 80 = 0.05 or 2/10ths of a millimetre to the scale of 5 mm. per metre (1 in 200).

The transition can, therefore, be transferred by ordinates 10 metres apart, even though it were not quite correct.

If we consider a circular arc of 500 metres radius, the arc 40 metres long will be transferred in the same way; its end abscissa being equal to 30.96, F F_1 = 0.04 or 2/10ths of a millimetre to the scale of 5 mm. per metre (1 in 200).

One question, however crops up.

When the ordinates are calculated by the exact formula given in the February 1934 *Bulletin* (see Note 1),

$$Y_n = 2 (n f_0 \cos \omega_0 + (n-1) f_1 \cos \omega_1 + (n-2) f_2 \cos \omega_2 + \ldots + f_{n-1} \cos \omega_{n-1} \quad (1)$$

at what distance from the origin may the point 1 be for the error to be within allowable limits?

This error of course depends on errors in measuring the versines from which the ordinates are calculated.

There are three sources of error :

— mistakes,

(1) See *Revue Générale des Chemins de fer*, June 1930, and lectures at the « Ecole Spéciale des Travaux Publics 1932-33 : « Distribution of short rails in circular curves and parabolic transitions », by Mr. Chappellet.

— systematic errors (inherent in the method),

— accidental errors.

The first two need not be considered, as the mistakes are easily brought out owing to the regularity of the lay-out, and by measuring the versines twice. Systematic errors can be corrected and avoided without difficulty as the unit of measurement is a double decimetre easily checked. Let us now consider accidental (occasional) errors (note 3).

The average quadratic error in measuring a versine being 1/2 millimetre (see Note 2), the error in measuring the ordinate at the end of a 210-metre arc is equal to 53 millimetres (see note 3).

The plotting scale being 0.005 m. p. m. (1 in 200), this error is represented by 2/10ths mm. Therefore, the possible accidental error in measuring the versines is negligible, and the arc A I can be of considerable length, the ordinates being calculated exactly by formula (1).

The curve arc has just been drawn down relatively to the tangent through its origin. The following method can also be used. After drawing down a curve arc as far as I, relatively to the tangent at its origin (fig. 1) let us draw the chord I H through the peg H. The chord I H extended towards T forms a new axis of the abscissæ and the ordinates erected thereon are calculated by renumbering the versines starting from point I.

Let I H be extended to L.

We then have

$$\sin \alpha = \frac{IM - HN}{HI}$$

$$LM = \frac{IM}{\tan \alpha}.$$

The chord H I can be plotted very accurately by drawing the line L I.

The accidental error in the direction of L I, i.e. on the tangent of the angle α must, however, be ascertained. Let us calculate this error.

Take the arc A I as 150 metres long; the accidental error for I M $= Y_{15}$:

$$\sqrt{\frac{15 \times 15.5 \times 16}{3}} = 35 \text{ mm.}$$

and the accidental error for H N $= Y_{14}$:

$$\sqrt{\frac{14 \times 14.5 \times 15}{3}} = 32 \text{ mm.}$$

are represented to the scale of 0.005 m. p. metre (1 in 200) by 2/10ths mm. and so are negligible.

The error along the tangent of the angle α equals :

$$\frac{35 - 32}{10} = 0.3 \text{ mm.}$$

Consequently the difference at point T situated 150 metres from point I is 4 cm. say 2/10 mm. on the plan to the scale of 0.005 m. p. metre.

Consequently, by this method a long curve can be transferred without appreciable error.

The calculation of the cosines although easy enough, may prove to be tedious. This can be avoided by using the approximation :

$$Y_n = 2\,(n\,f_0 + (n-1)f_1 + (n-2)f_2 + \ldots + f_{n-1}) \quad (2);$$

which can be done provided the rules given below be observed.

To fix our ideas we have calculated for R $=$ 1 000 m. and R $=$ 500 m., the exact value of a number of ordinates, their approximate values, the difference be-

tween the two values, which is the error due to the approximative formula (2) and the reduction to the scale of 0.005 m. per metre of this error.

R	D Developed length.	Y Exact value.	$y = \frac{S^2}{2R}$ Approximate value (1).	$y - Y$	$y - Y$ to the scale of 0.005 m. p. m.
500 m.	60	3.596	3.60	0.004	...
	70	4.893	4.90	0.007	...
	90	8.078	8.10	0.022	1/10 of a mm.
	100	9.967	10.00	0.033	1/10 of a mm.
	110	12.05	12.10	0.05	2/10 of a mm.
	120	14.33	14.40	0.07	3/10 of a mm.
	130	16.81	16.90	0.09	4/10 of a mm.
	140	19.47	19.60	0.13	6/10 of a mm.
1 000 m.	90	4.047	4.05	0.003	....
	100	4.996	5.00	0.004	...
	110	6.04	6.05	0.01	...
	140	9.78	9.80	0.02	1/10 of a mm.
	150	11.23	11.25	0.02	1/10 of a mm.
	160	12.77	12.80	0.03	1/10 of a mm.
	190	18.00	18.05	0.05	2/10 of a mm.
	200	19.93	20.00	0.07	3/10 of a mm.
	210	21.97	22.05	0 08	4/10 of a mm.

(1) $\frac{S^2}{2R} = 2 \Sigma \mathfrak{M}^t f = 2 \Sigma\Sigma f.$ (See Note No. 4).

This table shows that using the approximate formula (2) a curve arc of 120 m. developed length and 500 m. radius and a curve arc of 200 m. developed length and 1 000 m. radius can be drawn to the scale of 0.005 m. p. m. without appreciable error, the error on each end ordinate of the arc being 3/10th mm.

When the developed length of the arc to be plotted is longer, the curve, so as not to exceed the above negligible error can be drawn by using for the axes of the abscissæ the tangent to the origin and the successive chords, finding by trial the pegs through which these latter can be made to pass for the error on their direction to be negligible.

If we take a curve of 500 m. radius, the above table shows that the first chord can pass through pegs 6 and 7.

Indeed, the tangent of the angle between the chord through the ends of the exact ordinates of the curve at these pegs and that through the ends of the ordinates of the same rank calculated approximately equals

$$\frac{4.90 - 3\ 60}{9.915} - \frac{4.893 - 3.596}{9.915} = 0.0003.$$

In practice, these extended chords lie on the same line for a distance of 70 m. from peg 7, the distance apart at this point being only 0.02, i.e. 1/10th mm. on the drawing to the scale of 0.005 m. per m.

Consequently when the approximation (formula 2) is used, we can in the case of a 500-m. radius curve draw 70 m. of the curve along the tangent to the origin and 70 m. on the extended chords

through the pegs 6 and 7, 13 and 14, etc. The direction of these chords will be checked by calculating the angles, as for example α_3 (fig. 2) (see Note 1).

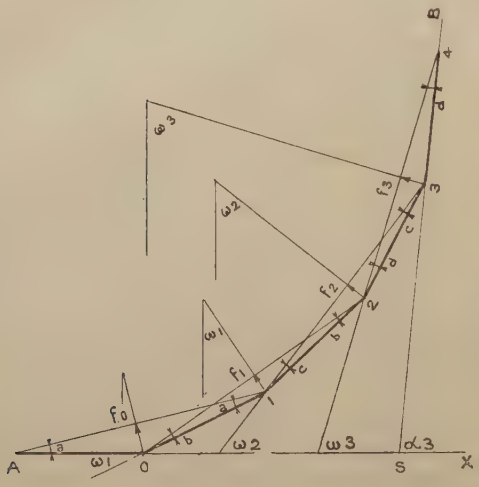


Fig. 2.

Taking a 1 000-m. radius curve, the above table shows that the first chord can pass through pegs 9 and 10.

As a matter of fact, the chord through the ends of the correct ordinates of the curve at these pegs makes with that through the ends of ordinates of same rank, found by the approximate formula, an angle the tangent of which is

$$\frac{5.00 - 4.05}{9.954} - \frac{4.996 - 4.047}{9.954} = 0.0001.$$

These chords when extended practically lie together for a distance of 100 m. from peg 10 at which point the distance apart is 0.01, which is negligible to the scale of 0.005 m. p. m.

A 1 000-m. curve can then be plotted by using the approximation for 100 m. on the tangent through the point of origin and for 100 m. on the extended chords through pegs 9-10, 19-20, etc.

The direction of these latter is checked by calculating the angles such as α_3 (fig. 2) (see Note 1).

Obviously, these conclusions are applicable to more or less regular curves or parts of curves with an average radius of 500 m. or of 1 000 m.

Other curves of different radii can be dealt with on similar lines.

The value of the ordinates calculated from formula (2) can also be easily corrected with sufficient accuracy as follows:

Let us consider part of a curve the versines of which are equal, in millimetres, to :

50, 100, 105, 107, 108, 102, 104, 104, 100, 103, 99, 98, 102, 95.

We find

$$y_{14} = 2 \Sigma \Sigma_0^{13} f = 20.198$$

(approximate value).

$$Y_{14} = 2 \Sigma \Sigma_0^{s} f \cos \omega = 20.046$$

(exact value).

The difference $y_{14} - Y_{14}$ between the approximation and the exact value of the ordinate at peg 14 is equal to 20.198 — 20.046 = 0.152.

On the other hand, the mean radius of this curve is 490 m., say 500 m.

For a developed length of 140 m. and R = 500 m. we have :

$y_{14} - Y_{14} = 19.60 - 19.47 = 0.13$. (See table above).

As the approximate value of y_{14} the ordinate at peg 14 as calculated by formula (2) is 20.198, all that is needed is to cut it down by 0.13 m., i.e. by the difference between the value given by the formula $\frac{S^2}{2R}$ with S = 140 and R = 500 and the value given in GAUNIN's table for R = 500 and D = 140 m.

Y_{14} obtained in this way is 20.198

— 0.13 = 20.068, i.e. the error, 20.068 — 20.046 = 0.022 is, to the scale of 0.005 m. p. m., negligible.

The ordinates therefore can be calculated approximately by formula (2) and be corrected as we have just illustrated by using an ordinary table of versines.

This method can be used to plot a long length of the curve relatively to the tangent at the origin.

Provided the pegs through which they pass are such that the error in direction is negligible, a number of chords can be used as axes of the abscissæ.

When the curve is connected to the straight by a parabolic transition, the better way is generally to draw firstly the parabolic transition relatively to the tangent through the point of origin, then the circular curve relatively to the chord passing through its two first pegs A and B, noting that difference C D = $\frac{a^2}{8\,R}$ between the chord A B and the tangent C X is to be taken into account (fig. 3) when

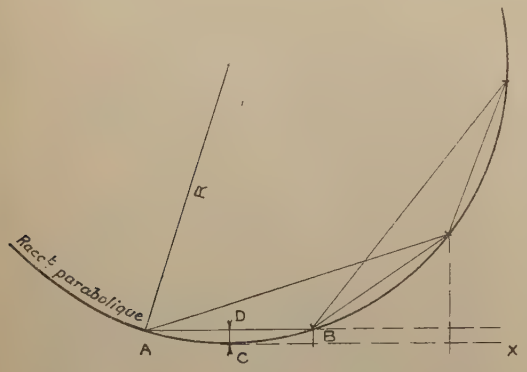


Fig. 3.

correcting the ordinates of the curve of mean radius R.

Another very simple way is to divide the curve into several parts in such a way that each adjacent part has at least three pegs in common. Each of these parts is drawn down by one of the above methods. They are then combined by superimposing the common pegs; this latter operation requires great care.

Whatever method be used, each circular part of the curve should be plotted in relation to the chord passing through the two middle pegs thereof, as this reduces the error in calculating the ordinates.

In order to draw accurately the tangent on leaving the curve the procedure given on page 600 will always be followed. As a check the angle such as α_3 (fig. 2) made by the chord through the last pegs n-1 and n on the tangent in question with the last extended chord taken as the axis of the abscissæ or with the tangent through the origin of the curve, will be calculated.

Fig. 4.

When having to plot such a layout as that of figure 4, if there is any doubt about it pegs A B C D must be checked to see if they fall on the same tangent by means of the transit instrument.

If not they will be brought to it, or if this is out of the question, the line A B O C D will be measured relatively to the straight line through pegs A and D.

This method is quick and flexible. The axis can be drawn down in the office of the divisional engineer by the technical assistant responsible for the location drawings. The gradient sections can be recorded and plotted by the foreman and

his assistants. The calculations are simplified as no greater degree of accuracy is required than that obtained by ordinary measurements.

The method can also be used to check plans got out by the usual methods.

The portions of curves in line with the angles of the polygonal layout of the survey to be checked being plotted, preferably in relation to a chord through two of their middle pegs, should lie exactly over those of the survey to be checked.

Finally is should be noted that checking the diagram of the versines of a curve to be surveyed (if deemed necessary) is of use in maintaining the track, whereas a polygonal layout is of no further value once the survey is completed. Much less time too is taken in making this check than in getting out a polygonal layout.

* * *

NOTE 1.

Let is take a curve (fig. 2) represented by the pegs 0, 1, 2, 3, etc. separated by the distance a.

Then let us draw the chords A.1, 0.2, 1.3, etc. and the versines f_0, f_1, f_2, f_3, etc. These latter make angles ω_0, ω_1, ω_2, ω_3, etc. with the perpendicular to the tangent A X.

We demonstrated in the *Bulletin* (February 1934) that the ordinate of a peg n to the tangent at the origin was equal to :

$$Y_n = 2\,[n f_0 \cos \omega_0 + (n-1)\, f_1 \cos \omega_1 + (n-2)\, f_2 \cos \omega_2 + \ldots + f_{(n-1)} \cos \omega_{n-1}]$$

For example :

$$Y_6 = 2\,[6 f_0 \cos \omega_0 + 5 f_1 \cos \omega_1 + 4 f_2 \cos \omega_2 + 3 f_3 \cos \omega_3 + 2 f_4 \cos \omega_4 + f_5 \cos \omega_5].$$

Figure 2 also shows that :

$$\omega_1 = 2a + b$$
$$\omega_2 = 2a + 2b + c$$
$$\omega_3 = 2a + 2b + 2c + d$$

or again, without appreciable error :

$$\omega_1 = \frac{2 f_0 + {}_1}{a}$$

$$\omega_2 = \frac{2 f_0 + 2 f_1 + f_2}{a}$$

$$\omega_3 = \frac{2 f_0 + 2 f_1 + 2 f_2 + f_3}{a}$$

and in a general way :

$$\omega = \frac{2 f_0 + 2 f_1 + 2 f_2 + \ldots\ldots + f_n}{a}$$

as the angles a, b, c, etc. being very small can be taken as equal to their sines.

As to the angle α_3 made by the chord through pegs 3 and 4 with axis D X, it equals

$$\omega_3 + d = \omega_3 + \frac{f_3}{a}$$

$$= \frac{2 f_0 + 2 f_1 + 2 f_2 + 2 f_3}{a} = 2 \Sigma_0^3 f;$$

or in general terms :

$$\alpha_n = \frac{2 \Sigma_o^n f}{a}$$

The angles between the extended chords taken as axes of the successive abscissæ and the angles such as α_3 between these chords and the axis A X can be calculated in this way, and thus be used to check the accuracy with which the curve has been plotted.

* * *

NOTE 2.

Any accidental error in measuring a versine is independent of its value.

Consequently, in order to ascertain the mean error the following method is used :

Three men each measured the same versines one hundred times; after each measurement the cord was removed, replaced, and stretched.

This operation was carried out twice, the versines first of all being obtained to the nearest 1/4th of a millimetre and then to the nearest whole millimetre.

The true value of the ordinates being taken as equal to the arithmetical mean of 100 versines to the nearest 1/4 mm. the average errors are :

± 0.26 mm., ± 0.2 mm., ± 0.28 mm. for the versines to the nearest 1/4 mm., or ± 0.25 mm.;

± 0.46 mm., ± 0.45 mm., ± 0.47 mm. when measured to the nearest mm. or ± 0.5 mm.

NOTE 3.

Calculation of the accidental error in measuring an ordinate.

For the calculation of this error let us consider the formulæ

$$Y_n = 2\,[n f_0 \cos \omega_0 + (n-1) f_1 \cos \omega_1 + [(n-2) f_2 \cos \omega_2 + \ldots + f_{n-1} \cos \omega_{n-1}].$$ (1)

$$\omega = \frac{2 f_0 + 2 f_1 + 2 f_2 + \ldots + f_n}{a}$$

$$\alpha_n = \frac{2 f_0 + 2 f_1 + 2 f_2 + \ldots + 2 f_n}{a}$$ (1)

$$= \frac{2 \Sigma_0^n f}{a}.$$ (See Note 1.)

Let us begin by ascertaining the total accidental error in the value of a cosine by taking $\alpha = 10$ metres.

The average error made in measuring a versine equals ± 1/2 mm. (See Note 2).

The sum $\frac{2 f_0 + 2 f_1 + 2 f_2 + \ldots + f_n}{10}$,

* * *

measuring the angle w_n can vary under these conditions by :

$$\pm 2\frac{1}{2\times 10} \pm 2\frac{1}{2\times 10} \pm 2\frac{1}{2\times 10} + \ldots + \frac{1}{2\times 10} = \pm\frac{1}{10} \pm \frac{1}{10} \pm \frac{1}{10} \pm \ldots \pm \frac{1}{20} = \pm(n-1)\frac{1}{10} \pm \frac{1}{20}.$$

---

(1) This approximate formula gives sufficiently close results. Applying it to a circular arc of radius R, developed length D, with a versine f for a chord $2a$, the angle at the centre α is :

$$\alpha = 2\,\frac{\frac{D}{a} \cdot f}{a} = \frac{D\ 2f}{a^2} : \left(\frac{D}{a}: \text{number of versines } f,\right)$$

but

$$f = \frac{a^2}{2\ R} + \frac{f^2}{2\ R}$$

whence

$$\alpha = \frac{D}{a^2}\,\frac{a^2}{R} + \frac{D}{a^2}\,\frac{2 f^2}{2 R} = \frac{D}{R} + \frac{D\ f^2}{a^2\ R};$$

Now, $\frac{D}{R}$ gives the measurement of the angle at the exact centre, so that the error made equals $\frac{D\ f^2}{a^2\ R}$ and is negligible, seeing that for R = 500, D = 200, f = 0.10, a = 10 m., we get :

$$\frac{D\ f^2}{a^2\ R} = 0.000\,004.$$

As the sum of several accidental errors is equal to the square root of the sum of their squares, we have

$$\pm(n-1)\frac{1}{10}+\frac{1}{20}=\pm\sqrt{n-1)\left(\frac{1}{10}\right)^2+\left(\frac{1}{20}\right)^2}$$

for $n = 20$.

The error in the value of the angle ω_{20}

$$\frac{2f_0+2f_1+2f_2+\ldots+f_{20}}{a}$$

equals 2/5 mm. which is negligible in calculating its cosine (1).

In calculating the accidental error made in measuring an ordinate, the cosines ω can consequently be neglected in formula (1) which can then be written :

$$Y_n = 2\,[nf_0+(n-1)f_1+\ldots+f(n-1)].$$

As the error in measuring a versine is $\pm$ 1/2 mm., the error in measuring an ordinate in mm. equals :

$$\frac{1}{2}\times 2\,(\pm n\pm(n-1)+\ldots\pm 1)=$$
$$\pm n\pm(n-1)\pm(n-2)\pm\ldots\pm 1$$

or the square root of the sum of the squares of the first n numbers, i.e.

$$\pm\sqrt{n^2+(n-1)^2+(n-2)^2+\ldots+1}=$$
$$\pm\sqrt{\frac{n\left(n+\frac{1}{2}\right)(n+1)}{3}}$$

Calculating in this way the values of the ordinates Y_{19} and Y_{20}, we get for Y_{19}

$$\pm\sqrt{\frac{19\times 19.5\times 20}{3}}=\pm 48\text{ mm.}$$

and for Y_{20} :

$$\pm\sqrt{\frac{20\times 20.5\times 21}{3}}=\pm 53\text{ mm.}$$

The accidental error in measuring a versine is independent of its value; moreover to measure the same versine one hundred times amounts to measuring one hundred versines on a curve of constant radius.

The above calculated errors can be compared, by using the average error, with those found by direct calculation.

For this purpose all that is needed is to calculate the ordinates of the curve with the versine assumed to be exact and equal to the arithmetical average of 100 measurements of the same versine to the nearest 1/4 mm., then the same ordinates measured to the nearest millimetre. (See Note 2).

Thus, by difference and directly, we find the errors made in calculating the ordinates.

These calculations, made on the three groups of 100 measurements of versines mentioned above, give for the ordinates Y_{20} of different arcs of 200 m. developed length the following errors, in millimetres :

— 0.7; — 30.7; — 1.7; + 23; + 41; — 7; — 14; — 18; + 0.5; + 34; + 16; — 9; + 1; — 32; — 9.

The accidental errors on the ordinates Y_{100} of different arcs of 1 000 m. developed length found by direct calculation, would be : — 126 mm.; — 205 mm.; — 48 mm.

These errors are smaller than those

(1) Even if we take the accidental errors as all having the same sign, the error on the product $f_{n-1}\cos\omega_{n-1}$ will not exceed 0.00008 when $f = 0.10$, D = 200 m., R = 500 m., which would give for Y_{20} an error of 0.008, quite negligible to the scale of 0.005 m. p. m.

obtained using the average error and are negligible to the scale of 0.005 m. p. m.

As regards the errors in measuring the angles corresponding to 200 m. developed length the calculation using versines measured to the nearest millimetre are the following, in millimetres :

$$\frac{2}{10}, \frac{2}{10}, \frac{2}{10}, \frac{2}{10}, \frac{6}{10},$$
$$\frac{1}{10}, \frac{1}{10}, \frac{7}{100}, \frac{6}{10}, \frac{5}{10},$$
$$\frac{8}{100}, \frac{5}{10}, \frac{8}{100}, \frac{3}{10}, \frac{3}{10}.$$

These accidental errors are smaller than those found when the average error is used. The errors when the versines are obtained to the nearest 1/4 mm. are, of course, still smaller.

* * *

NOTE 4.

Approximate calculation of the ordinates of a circular arc.

The approximate value of the ordinate of the point X situated at a distance S from the tangent point T equals twice the sum of the moments in relation to point X, of the versines between the tangent point T and the point X; or, what amounts to the same thing, to twice the moment of the sum of these versines in relation to the point X.

For a developed length S there are $\frac{S}{a}$ versines and their sum equals

$$\frac{S}{a} \cdot \frac{a_2}{2R} = \frac{a^2}{2} \cdot \frac{S}{a} \cdot \frac{1}{R};$$

(a : equi-distance between the ordinates) i.e. the product of $\frac{a^2}{2_R}$ by the sum of the curvatures between T and X, since there are $\frac{S}{a}$ curvatures equal to $\frac{1}{R}$.

Calculating the moment of the sum of the versines

$$\frac{a^2}{2} \cdot \frac{S}{a} \cdot \frac{1}{R}$$

in relation to X therefore amounts to calculating the moment of the sum of the curvature in relation to this same point.

This sum of the curvatures obviously acts at the centre of the length T X at a distance $\frac{S}{2a}$ expressed as a multiple of the equi-distance.

Its moment in relation to X equals :

$$\frac{a^2}{2} \cdot \frac{S}{a} \quad \frac{1}{R} \cdot \frac{S}{2a} = \frac{S^2}{4R}$$

and the ordinate through point X equals

$$2 \cdot \frac{S^2}{4R} = \frac{S^2}{2R}$$

From this we get :

$$\frac{S^2}{2R} = 2 \Sigma \mathfrak{M}^t f = 2 \Sigma\Sigma f$$

This formula is identical with the well known formula

$$Y = \frac{X^2}{2R}$$

in which the abscissæ X is represented by the developed length S.

* * *

NOTE 5.

Calculation of the angle at the centre of a curve arc.

Let us consider figure 2.

The angle α_3 obviously equals the angle at the centre of the curve arc of any given form tangent at the peg 0 to the straight alignment A S and, at peg 3, to the straight section S B.

We have :

$$\alpha^3 = \omega_3 + d = \omega_3 + \frac{f_3}{a},$$

$$\omega_3 = \frac{2f_0 + 2f_1 + 2f_2 + f_3}{a}, \text{ (see Note 1)}$$

whence

$$\alpha_3 = \frac{2f_0 + 2f_1 + 2f_2 + 2f_3}{a} = \frac{2\,\Sigma_0^3 f}{a}.$$

In the same way the angle at the centre of any curve arc n equi-distances long equals :

$$\alpha_n = \frac{2\,\Sigma_0^n f}{a}.$$

We have also seen that the average error on the measurement of a versine is equal to $\pm$ 0.00025 (see Note 2) when carefully measured and not rounded off to the nearest millimetre.

Consequently the total error in measuring the angle

$$\alpha_n = \frac{\pm 2 \times 0.00025}{a}\sqrt{n} = \frac{\pm\, 0.0005\,\sqrt{n}}{a}.$$

In the case of a curve with 100 versines (990 metres developed length), the equi-distance being 10 metres, this error amounts to

$$\sqrt{100} \times 0.00005 = 0.0005 = 0^\circ\, 1'43''. \text{ (1)}$$

If we were to consider a curve of 1 000 metres radius, of such developed length that the angle at the apex is inaccessible, the polygonal layout needed for measuring this angle involves the surveying of some four angles.

In topographical work of average accuracy, the average error in measuring an angle being 1', the total error on the four angles is :

$$\sqrt{4} \times 1' = 2'.$$

If the radius is 500 metres, for the same developed length, the polygonal layout will have seven angles to be surveyed, and the average total error is :

$$\sqrt{7} \times 1' = 2'.8.$$

The measurement of the angle at the centre of a curve by the versines therefore gives a degree of accuracy similar to that obtained with the usual topographical methods of ordinary accuracy.

The advantage of using the versines is the greater the larger the number of angles to be surveyed.

---

(1) Calculating the error with versines to the nearest millimetre, the exact value of the versine being supposed equal to the arithmetical value of 100 versines to the nearest 1/4 mm. we found for several arcs of 1 000 metres developed length, an average error of 0° 1' 23".

[656. 222.1]

Note on Train Speeds,

by Lionel WIENER,
Professor at the University of Brussels.

PART II *(Continued)* [1]

Train speeds and services in different countries.

XVI. — DENMARK.

SUMMARY.

CHAPTER XLVI.

Crossing the channels.

1. General.
2. The ferryboats (train ferries).
3. Present position of the Danish ferryboat services.
4. Inter-island services.
5. Bridges.
   Substitution of fixed bridges for ferryboat services.

CHAPTER XLVII.

The Danish Railways.

1. General. — The railway system.
2. Electric traction.
3. Diesel traction.
   Locomotives.
   Tractors.
   Railcars.
4. Sleeping- and restaurant-car services.
5. Train speeds.
6. Conclusion.

CHAPTER XLVI.

Crossing the channels.

XLVI-1. — General. — Special methods are applied owing to the peculiar cutting up of the country: Jylland (Jutland), deeply indented by estuaries difficult to cross (Vejle Fjord, Randers Fjord, Mariager Fjord) and the Limfjorden (Oddesund and Salingsund) which completely sever the northern part of the country; the great islands of Fyn (Fünen) and Sjaelland (Sealand); the smaller islands of Als, Langeland, Lolland, Falster and Möen, all of which can be reached by unbroken railway services, besides a number of minor islands, which are only reached by boat.

No other country in the world, with the possible exception of Japan, lends itself more readily than does Denmark to the establishment of ferryboat services both for internal and international traffic. Yet, on account of the time lost in loading and unloading on both sides of

(1) Cf. *Bulletin of the Railway Congress,* October and November 1933; January, May, June and July 1934; February, March, April, May, July and October 1935; March and May 1936.

the straits, the overall speed suffers and it becomes useless to introduce very fast rail services across the islands when so much time is lost in passing from one island to the next.

When the traffic justifies such a step — as it now does — it becomes necessary to build fixed bridges in lieu of the ferry services. The resulting increase in speed then considerably helps the railways in fighting competition from other methods of transport.

The ferryboat services therefore affect the speeds and services of the Danish trains in various ways and make it possible to assure unbroken services between the North and South of Jutland, between the different islands, and between the Danish islands, Mecklenburg and Sweden.

The State maintains eight, and the Companies four of the ferries, one of which carries narrow-gauge rolling stock.

XLVI-2. — **Ferryboat services** (fig. 282). — The first ferryboats were built for the Little Belt in 1872 and 1877, at Newcastle, and had a capacity of 5 wagons only. They were paddle boats which could make 8 knots and carry 300 passengers.

The Oddesund services were inaugur-

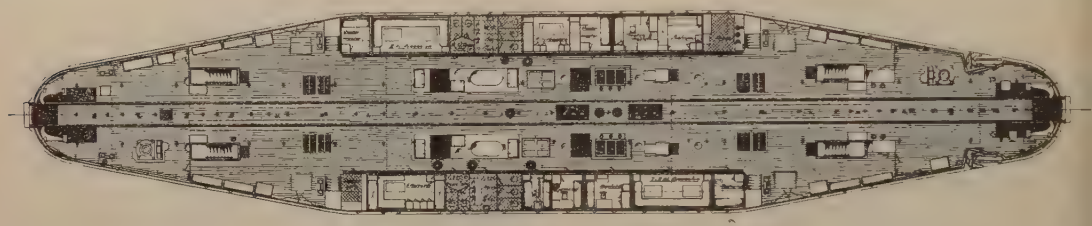


Fig. 282. — Main deck of the single-track train ferry « Fynn », built in 1920.

ated in June 1883, and in November, the much wider crossings of the Great Belt. The Störstrom service (Masnedö) followed in January 1884. To complete the fleet, 4 large units with a capacity of 16 wagons were purchased, and these were followed by a few others, for the less important services, with a 6-wagon capacity only.

Continuous rail connection was thus established between Copenhagen, Jutland, and the North of the peninsula, but this was not the case for the Copenhagen, Prussia and Sweden connection. The Nordischer Lloyd therefore introduced, in 1886, a steam-packet service between Warnemünde and Gjedser, the southern extremity of the Danish railways, a distance of 45 km. (28 miles), and maintained it until the beginning of the present century.

In the meantime, further ferryboat services were introduced : the Salingsund service in the North (in 1889); a couple of services across the Oresund between Denmark and Sweden; a shorter one in March 1892, and a longer service between Copenhagen and Malmö in 1895).

The « Jutland », bought in 1894, was a screw boat which could carry 10 wagons, and the « Köbenhavn », bought in 1895, carried 18. All the larger boats had two tracks, the maximum possible for steam ferries. By 1898 the fleet al-

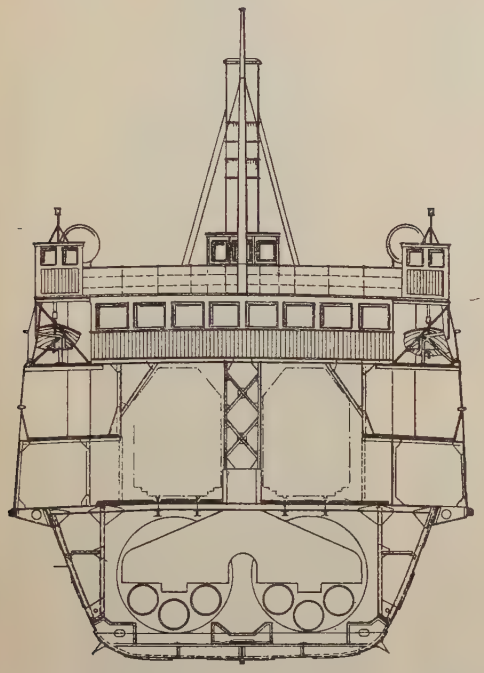


Fig. 283. — Cross section of the two-track train ferry « Odin », built in 1919, showing the loading gauge.

ready consisted of 15 units, 12 of which were paddle boats and 3 (including one on order) screw boats. They could all be loaded from either end, and had fore and aft rudders.

In competition with a German maritime service which linked Germany with Sweden, the possibility of replacing the Danish maritime service from Gjedser to Warnemünde by a train ferry service was considered in 1898, and carried out in 1903.

The different services made rapid progress until and even during the War, and so as to further improve them it was decided to add diesel units to the ferry fleet.

The first new unit was purchased in

Fig. 284. — View of the two-track train ferry « Danmark », built in 1922.

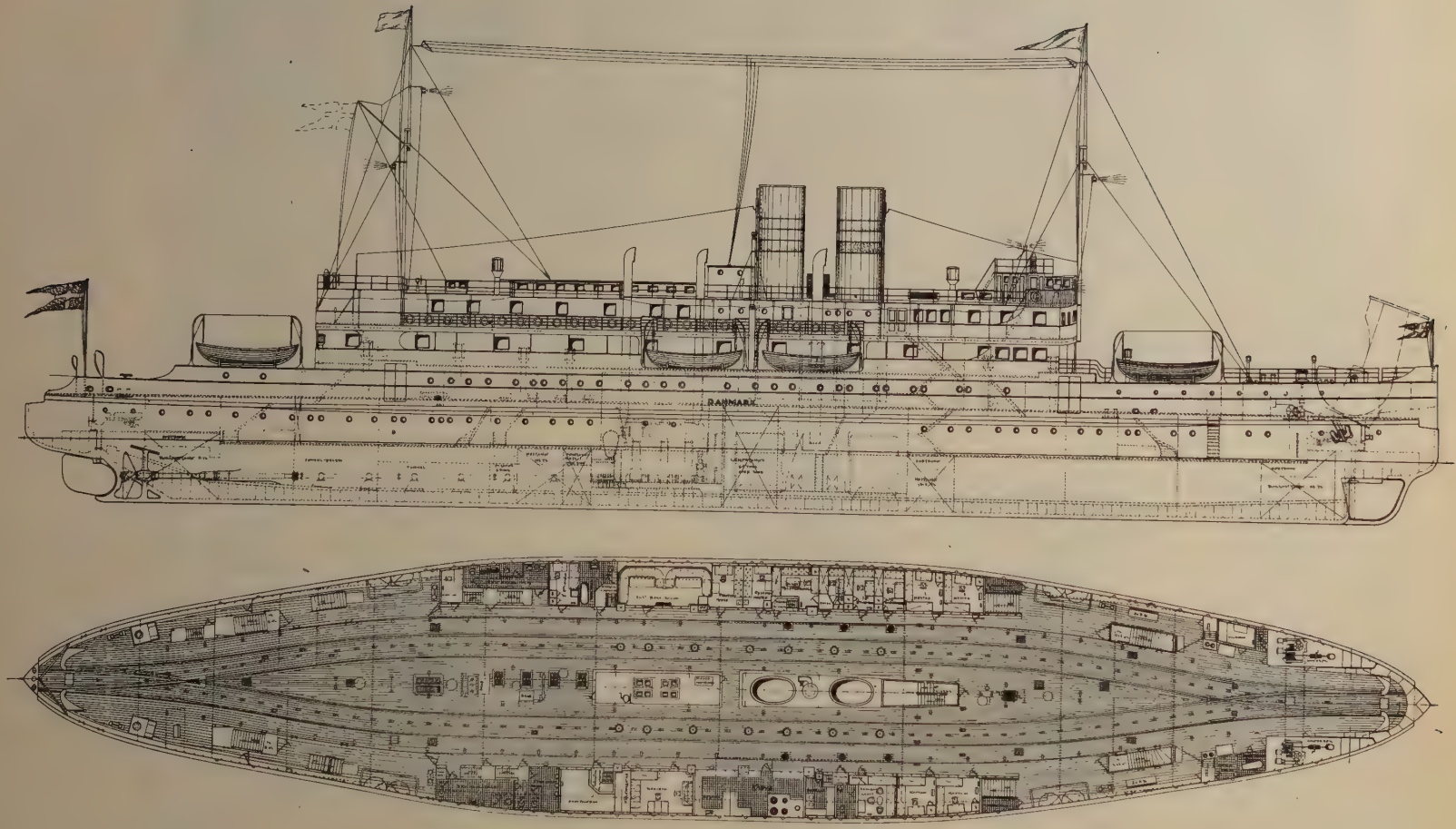


Fig. 285. — The « Danmark », a two-track train ferry, built in 1922.

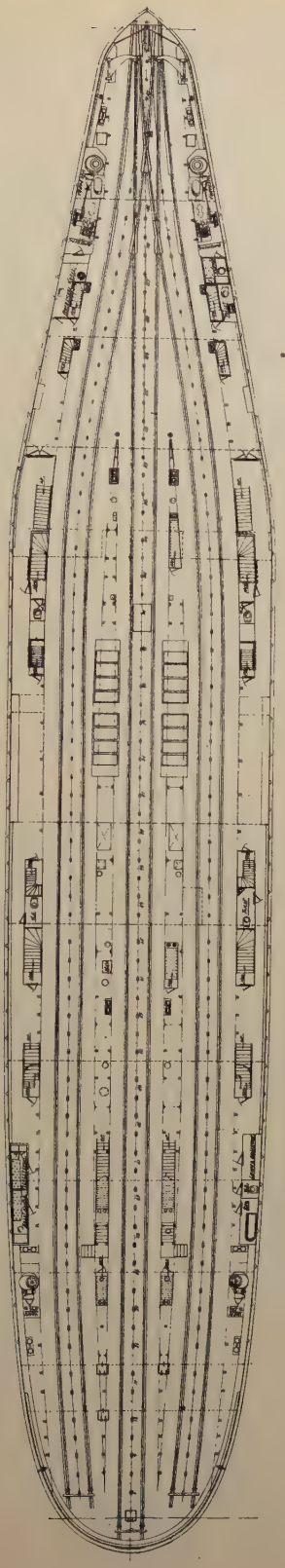


Fig. 286. — Main deck of the three-track train ferry « Nyborg », built in 1932.

1927. This was the « Korsör » which was put into service on the Great Belt. Thanks to the substitution of diesel for steam engines, she carried three tracks instead of two, which increased her capacity by 70 %. In 1932 the « Nyborg », was commissioned, bringing the total number of ferryboats up to 24. Besides these, the Administration owned 6 packet-boats and 4 ice-brakers; 20 units were daily in service, the larger ones crossing from Nyborg to Korsör some 10 or 12 times.

Tables 266 and 267 give the leading dimensions of a series of Danish ferryboats. We have selected examples with one, two, or three tracks, built at different periods to show the progress that has been achieved (figs. 282 to 286).

On the « Nyborg » the three tracks link up at the bow, and are closer together at the stern (fig. 286). The overall length of the centre track is 97.36 m. (319 1/2 feet), and that of the two side tracks 94.86 m. (311 feet). The useful lengths are :

Centre track	. . .	72.89 m. (236′ 5″).
Lateral tracks	. . .	80.605 m. (262′ 7″).

XLVI-3. — **Present position.** — Owing to the insular situation of Copenhagen, ferryboat services have to be included in all main lines; the western one crosses in turn the Great and the Little Belts before reaching Jutland; the northern crosses the Sund at Helsingör, and the eastearn at Copenhagen itself; finally, in crossing Falster the southern uses ferryboats both to reach and to leave the Island, which enable it to reach terra firma in Mecklenburg.

There are other minor island services, besides rail ferries across the great fjords which cut into Jutland.

Line from Copenhagen to Jutland. — The first Danish ferryboat service was introduced on the Little Belt in 1872, between Jutland and Fyn (Fünen). It was worked by single-track paddle boats

T

LEADING DIMENSION

FERRY.	Lillebelt.	Korsör.	Alexandra.	Pr. Fre
Date	1872	1883	1892	189
Builder	Richardson, Newcastle.	Kockum, Korsör.	B. & W. Copenhagen.	Helsin
Type	Paddle	...	...	...
Service	Little Belt.	Great Belt.	...	...
Railway tracks, number	1	2	1	1
Do. length	...	...	63.90 m. (209′ 8″)	52.30 (171′ 6
Capacity, wagons	5	16	...	...
Do. tons	...	...	...	...
Do. passengers	...	...	...	...
Length	42.70 m. (140′ 1″)	75.80 m. (248′ 8″)	65.53 m. (215′)	54.87 (177′
Beam amidships	7.90 m. (25′ 11″)	10.40 m. (34′ 1 1/2″)	13.38 m. (43′ 11″)	13.38 (43′ 1
Maximum beam over fenders (over paddle boxes) if any	...	...	...	...
Depth at keel	...	...	4.938 m. (16′ 2 1/2″)	4.90 (16′ 1
Draught	2.20 m. (7′ 2 5/8″)	2.80 m. (9′ 2 1/4″)	2.54 m. (8′ 4″)	2.80 (9′ 2 1
Indicated horse-power	340	1 700	...	...
Registered tonnage, gross	306	971	490.2	413
Do. net	125	436	268.9	169
Speed, ahead . . . knots	8	13	10	10
Do. astern . . . knots	...	...	...	...
Do. average . . . knots	...	...	...	...

SH TRAIN FERRIES.

Thyra.	Köbenhavn.	Odin.	Fyn.	Danmark.	Korsör.	Nyborg.
1893	1895	1910	1920	1922	1927	1932
. & W. penhagen.	B. & W. Copenhagen.	B. & W.	B. & W.	Helsingör.	B. & W.	B. & W.
Paddle.	Paddle.	...	...	...	Diesel.	Diesel.
...	Little Belt.	...	...	...	Great Belt.	Great Belt.
1	2	2	1	2	3	3
...	...	85.75 m. (281′ 3″)	66.00 m. (216′ 6″)	157.20 m. (515′ 9″)	236.28 m. (775′)	248.35 m. (815′ 8″)
6	18	...	...	...	...	...
76	226	...	...	...	...	600
...	...	...	1 000	1 100	1 500	1 500
53.90 m. 176′ 10″)	85.50 m. (280′ 6″)	88.90 m. (291′ 8″)	67.94 m. (222′ 11″)	101.72 m. (315′)	96.80 m. (315′)	102.50 m. (336′ 3″)
7.90 m. 25′ 11″)	10.40 m. (34′ 1 1/2″)	17.70 m. (58′ 1″)	13.38 m. (43′ 11″)	15.70 m. (51′ 6″)	16.50 m. (54′ 1″)	17.20 m. (56′ 5″)
13.40 m. ′ 11 1/2″)	17.70 m. (58′ 1″)	...	...	18.75 m. (61′ 6″)	17.70 m. (58′ 1″)	17.70 m. (58′ 1″)
3.90 m. 2′ 9 1/2″)	5.10 m. (16′ 9″)	5.08 m. (16′ 8″)	4.62 m. (15′ 2″)	7.05 m. (20′ 2″)	6.15 m. (20′ 2″)	5.20 m. (17′ 1 1/4″)
2.40 m. 10 1/2″)	2.90 m. (9′ 6 3/16″)	4.49 m. (14′ 9″)	3.49 m. (11′ 5″)	4.27 m. (14′)	3.71 m. (12′ 2″)	4.127 m. (13′ 6 1/2″)
652	2 155	...	...	3 600	5 100	3 400
410	1 091	1 524	799	2 726.79	2 362.52	2 555
188	425	600	309	1 071.85	955.49	1 219
11.1	14	15.12	10.5	15.5	15.5	15.5
10.5	14	...	...	...	...	...
9.5	12.5	...	...	...	...	...

TABLE 267.

DANISH STATE RAILWAYS TRAIN FERRY SERVICES.

(Reserve units are shown *in italics.*)

SEA PASSAGE.	Length. Km.	Length. Miles.	Time spent.	Single-screw.	Double-screw.	Paddle.	Number of tracks.
Strib-Fredericia (formerly)	3	1.86	15 m.	...	2	1 + 2	1
Korsör-Nyborg	26	16.2	1 h. 10 and 1 h. 20	*1*	3+1 for m. c. *2*	... *1 for mot. c.*	3 2
Helsingör-Hälsingborg	5	3.1	20 m.	*1*	...	1	1
Copenhagen-Malmö	30	18.6	1 h. 30	...	1 + *1*	...	2
Masnedö-Orehoved	4	2.5	10 m. or 25 m.	*1*	...	2	1
Gjedser-Warnemünde	45	28.0	1 h. 55 and 2 h. 30	...	2 + *2*	...	2
Oddesund South and North	3	1.86	15 m.	...	*1*	1	1
Glyngöre-Nykjöbing (Mors)	4	2.5	17 m.	1	*1*	...	1
Kalundborg-Aarhus	90	55.9	4 h. 45	...	...	...	...

which could carry 5 wagons. As the Baltic tide is slight, drawbridges sufficed to link the boat with the railway tracks at at the ports of Fredericia and Strib (Middelfart). All improvements in ferryboat construction, besides some original features, have been adopted since.

Of the five small ferryboats in service (two of which held in reserve) two have at each end a screw worked independently by the high and low-pressure cylinders of the triple expansion engines.

The channel being relatively narrow, a bridge over the Little Belt has since been built and opened to traffic on the 15th May 1935, since when the train ferries were no longer required. The two most recent units have been transferred to Masnedö for the Störstrom service, and the four others, broken up. The harbour stations of Fredericia and Strib have been considerably reduced in size and one of the two tracks of the Middelfart-Strib section, has been taken up.

STORE BELT (GREAT BELT) SERVICES. — NYBORG TO KORSÖR. — The Little Belt service was so successful that in December 1883 a ferryboat across the Great Belt, which separates the islands of Fyn and Sjaelland, was introduced. This was a much more ambitious undertaking than the former but it proved as successful.

At the present time, this service is worked by 3 large fast ferryboats and a motor-car carrier. These are all double-screw diesel boats with 8-cylinder Burmeister & Wain engines on the passenger boats, and 6-cylinder Frichs engines on the carrier. They make 10 to 12 journeys in an hour and a half daily.

SERVICES EAST OF COPENHAGEN. — There are two such services, one across the narrowest part of the Sund at Helsingör, and the other from Copenhagen across the Öresund to Malmö, giving a through train connection with Stockholm and Oslo. These services were inaugurated in 1891 and 1895 respectively.

Table 268.

TRANSPORT BY DANISH TRAIN FERRIES.

Sea route.	Date opened.	Length.		Wagon carrying capacity. Train ferry with			Number of train ferries with			Carried in 1933-34.	
		Km.	Miles.	1 track.	2 tracks.	3 tracks.	1 track.	2 tracks.	3 tracks.	axles.	wagons.
State Railways.											
rsör-Nyborg	Dec. 1883	26.0	16.2	...	18 wagons or 7 sl. c.	30 wagons or 10 sl. c.	...	3	3	408 200	204 000
snedö-Orehoved	Jan. 1884	3.5	2.2	7 wagons or 3 sl. c.	...	...	3	...	...	177 919	88 800
singör-Hälsingborg	March 1892	5.1	3.2	7 wagons or 3 sl. c.	...	...	2	...	...	47 356	23 678
penhagen-Malmö	Oct. 1895	29.7	18.5	...	16 wagons or 6 sl. c.	...	...	1	...	22 123	11 000
ib-Fredericia	March 1892 Suppr. 1925	2.8	1.7	8 wagons or 3 sl. c.	...	...	5	...	...	421 190	210 000
kjöbing-Glyngöre	Oct. 1889	3.7	2.3	4	..	...	2	...	...	31 648	15 820
edser-Warnemünde	Projected 1898	44.5	27.7	...	18 wagons or 7 sl. c.	...	...	1	...	39 054	18 000
desund S. - Oddesund N.	June 1883	2.5	15 5	5 wagons or 2 sl. c.	...	...	2	...	...	57 290	23 600
Companies.											
valpsund-Sundsöre	...	1.5	0.9	4	...	...	1	...	...	1 000	500
aborg-Mommark	...	24.0	14.9	5	...	...	1	...	...	6 700	3 350
endborg-Rudköbing	...	18.0	11.2	5-6	...	...	1	...	...	13 200	6 560
Metre gauge.											
ssens-Aarösund	...	14.0	8.7	3-4	...	...	1	...	...	2 480	1 240

The first of them is a purely Danish service, in which Sweden holds a half interest. A single unit is able to cover the service during the Winter months, and two in Summer.

The Malmö service is a Danish-Swedish service, each of the two railway administrations supplying a unit, which is kept in service 14 days and then in reserve for a like period.

INTERNATIONAL SOUTHERN SERVICE. — In order to reach Mecklenburg at Warnemünde after leaving the island of Sjaelland, the Ström Sund is crossed between Masnedö (Sjaelland) and Orehoved (north of Falster) and Falster Island, to its very end at Gjedser.

Two paddle boats work the ferry service, with a third in reserve. As in the case of the Little Belt, the width of the strait is such that it was found possible to bridge it, the work having to be completed by 1937, when it will be possible to reach the southernmost point of the Kingdom by land.

The Gjedser-Warnemünde service is one of the oldest in the country. It is a mixed Germano-Danish service, each of the two Administrations supplying one boat in active service and one in reserve, the German ferryboat having three tracks and the Danish two only. The latter is a 3 000-ton boat which can carry 18 wagons and 1 500 passengers.

THE NORTHERN FERRYBOAT SERVICES. — Several railway lines serve Jutland from South to North, joining Hamburg, Berlin, and Copenhagen with the Limfjorden, which cut the country in two, from West to East.

The two outer railways cross the fjord; the Struer railway crosses the Oddesund so as to reach the town of Thisted; the Randers-Aalborg Railway crosses it by means of a bridge which links it up with Nörre-Sundby on the northern side; it further runs on to Frederikshavn.

Of the two middle lines, one ends at Lögstör on the southern side of the fjord, and the other at Nykjöbing in the island of Mors, on the northern side of the fjord. This is reached by a 4-km. (2.5 miles) ferryboat crossing from Glyngöre, worked by means of a diesel boat with a 6-cylinder Frichs engine, and screws at both ends.

In addition, a private company has built a 75-km. (46.6 miles) railway from Aalborg and Aars to Hvalpsund, where an arm of the fjord is crossed by ferryboat so as to reach Sundsore 1 500 m. (0.93 mile) further on.

XLVI-4. — **Inter-island services.** — *a*) Sjaelland is linked up with neighbouring parts by means of four ferryboat services; to the East, the Helsingör and Copenhagen services towards Sweden; to the South, the Mäsnedsund service towards Germany, and to the West, the Korsör service to Fyn and Jutland.

TABLE 269.

Korsör-Nyborg	Fyn Island.	Steam ferry.	26 km.	(16.2 miles)
Helsingör-Hälsingborg . .	Sweden.	Do.	5 km.	(3.1 miles)
Copenhagen-Malmö . . .	Do.	Do.	29.7 km.	(18.5 miles)
Masnedö-Örehoved	Falster Island.	Do.	3.5 km.	(2.2 miles)
Kallehave-Stege	Möen Island.	Motor ferry.	1.1 km.	(0.7 miles)
Kalundborg-Aarhus . . .	Jutland.	Boat.	160 km.	(99.4 miles)

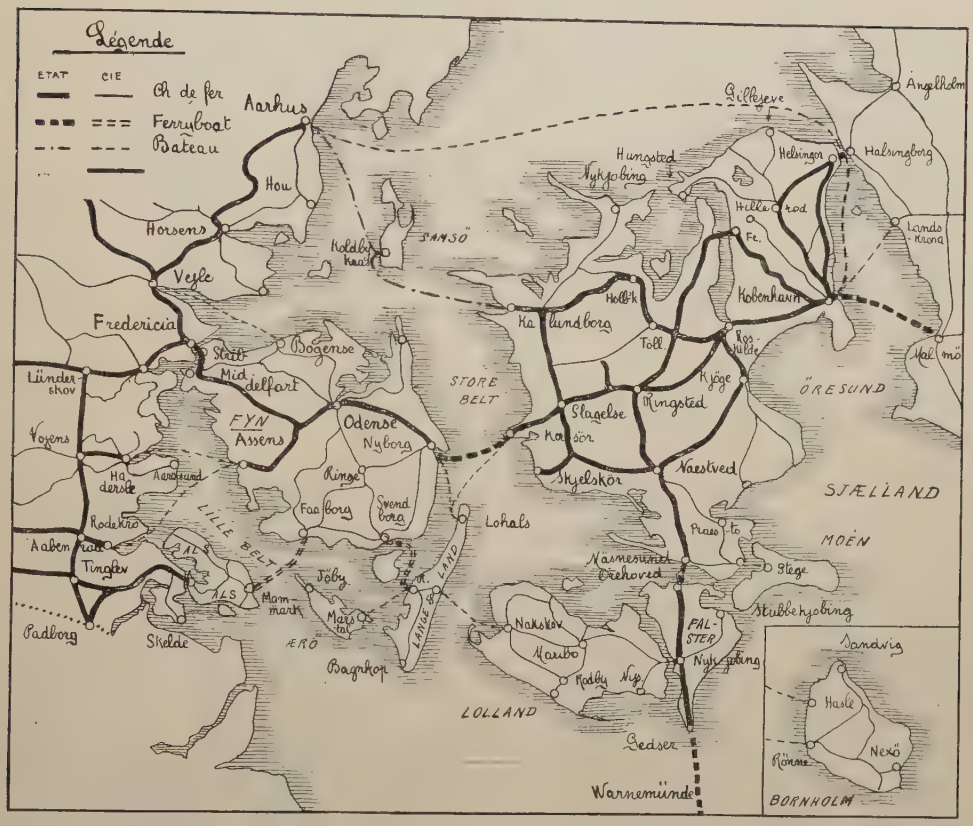


Fig. 287. — Inter-island services, and apportionment of the railway and ferryboat services between the State Railways (heavy lines) and private Companies (thin lines).

The Aarhus service is worked by ordinary boats calling at Koldby Kaas in the Samsö Island. There is a certain similarity between the Copenhagen-Aarhus and the Amsterdam-Leeuwarden services. As in Holland, there is a mixed land and sea route, and an all-railway service via Fredericia, in Denmark and via Enkhuizen, in Holland. The various Danish services between Copenhagen and Aarhus are shown in table 270.

TABLE 270.

COPENHAGEN AND AARHUS SERVICES.

ROUTE FOLLOWED.	Distance.								Time spent.	Number of stops.
	Railway.		Ferry.		Boat.		Total.			
	Km.	Miles.	Km.	Miles.	Km.	Miles.	Km.	Miles.		
By the Cattegat . . .	...	...	...	...	200	124.3	200	124.3	8 h. 00	0
Via Kalundborg . . .	111	69.0	...	...	160	99.4	271	168.4	5 h. 59	4
Via Fredericia	313	194.5	40	24.9	...	. .	353	219.4	6 h. 52	9
Do. (Lyntog).	Do.	Do.	Do.	Do.	...	...	Do.	Do.	4 h. 37	1

b) FYN.

In addition to the State rail ferries, Fyn is the starting point of two services worked by private companies :

TABLE 271.

RUN.	Fyn to	Class.	Distance.	
			Km.	Miles.
Strib-Fredericia	Jutland.	*Formerly ferry.*	2.8	1.7
Nyborg-Korsör	Sjaelland.	Ferry.	26	16.2
Svendborg-Rudkjöbing .	Langeland.	*South Fyn Co.*	18	11.2
Faaborg-Mommark . . .	Als.	*Mommark Ferryboat Co.*	24	14.9
Assens-Aarösund . . .	Jutland	*Lillebelt Crossing Co.* Narrow-gauge ferry.	14	8.7

XLVI-5. — **The bridges.** — Though rail ferries cross important sea channels, a series of bridges have been built over the narrower straits, and wherever possible fixed bridges have replaced the train ferries.

The most important among the former are the Limfjord bridges between the towns of Aalborg and Nörre-Sundby (1), those over the Masnedsund, between the town of Masnedsund and the island of Masnedo, and from this island to Orehoved, as well as the Roskildefjord bridge. The maximum train speed over them is limited to 15, 25, and 30 km. (6.2, 15.5 and 18.6 miles) an hour respectively.

Similar restrictions are imposed on the bridges over the Frederikssund, Roskildefjord (2) (Sjaelland island), and the

(1) The Limsfjord bridge at Aalborg (built from 1874 to 1879) belonging to the *State Railways*, is also used by the *Fjerritslev-Nörre-Sundby-Fredrikshavn* Railway. It is a 369-m. (1 210 1/2 feet) long lattice girder bridge with a 54-m. (177 feet) swing span. It is now being replaced by a steel bridge 402.20 m. (1 319 feet) long, with a 37.80-m. (124 feet) lift span.

(2) The Frederikssund railway bridge over the Roskildfjord is a 222.60 m. (729 feet) long lattice girder bridge with 37.80-m. (124 feet) lift span. It was built between 1925 and 1928.

Nykjöbing bridge on the Guldborgsund, separating the islands of Falster and Lolland, and in Jutland, on the Mariagerfjord bridge between Hadsund North and South (1). The two latter ferryboat services are owned by a private company.

The Danish railways are systematically strengthening their permanent way so as to be able to increase the speed of their trains. New bridges are therefore, taking the place both of older bridges and of certain ferryboat services.

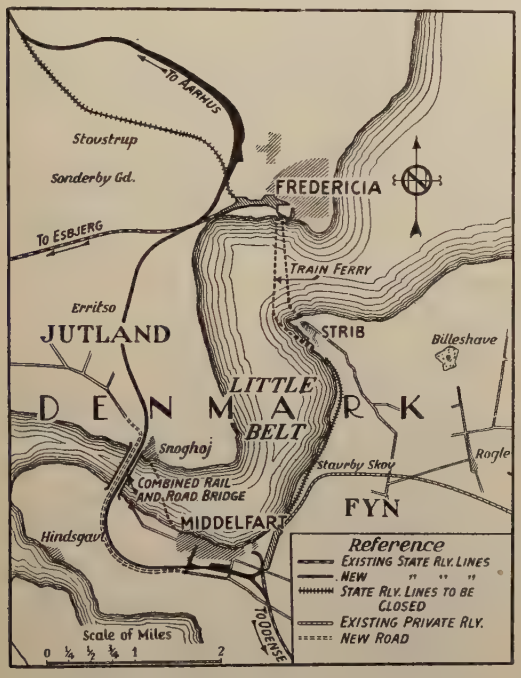


Fig. 288. — Map showing location of the Lillebelt bridge and ferryboat line.

Substitution of fixed bridges for ferryboat services. — Of the two crossings of the Limfjorden, that of Aalborg to Nörre-Sundby, made by means of a fixed bridge since 1879, is being reconstructed.

Such is not the case with the Oddesund crossing, where since the 1934 Spring a 472-m. (1 548 1/2 feet) long bridge is being built to replace the ferryboat service (2); this bridge built to specifications similar to those for the Storström bridge, is to be completed by January 1938.

The construction of the (Lillebelt) Little Belt bridge (fig. 289) was decided upon in 1924 and the scheme completed in 1929 by the inclusion of a roadway. It is 16.50 m. (54 feet) wide, including a 5.60-m. (18 ft. 5 in.) roadbed and a 2.25-m. (7 ft. 4 1/2 in.) cantilever footway (fig. 290); these dimensions are practically the same as those of the Storström bridge, whose construction was decided soon afterwards. Figure 288 reproduced from *The Railway Gazette*, shows the location and modifications in layout of the railways in this district.

The maximum depth of the strait is 41 m. (133 feet) and 31 m. (100 feet) near the deepest pile; the maximum height of the piles is 73 m. (239 ft. 6 in.). As it was necessary to leave a clear space of 33 m. (108 feet) above water for navigation purposes, the maximum height of the structure is 97 m. (318 ft. 3 in.).

Work on this 1 177.80 m. (3 864 feet)

(1) The Hadsund rail and road bridge belongs to the *State Railways*, but is operated by the *Randers-Hadsund* Railway, and is also used by the *Aalborg-Hadsund* Railway. It is a steel lattice girder bridge, 270 m. (886 feet) long, with a swing span 58.40 m. (191 1/2 feet) long. It was built in 1903-1904 and rebuilt in 1926.

(2) The Oddesund bridge with a clear 5 m. (16′ 5 in.) above water, has three 60.70-m. (199 feet) spans, and seven of 34.50 m. (133 feet); one of the latter lifts to give a clear passage 30 m. (98 1/2 feet) wide.

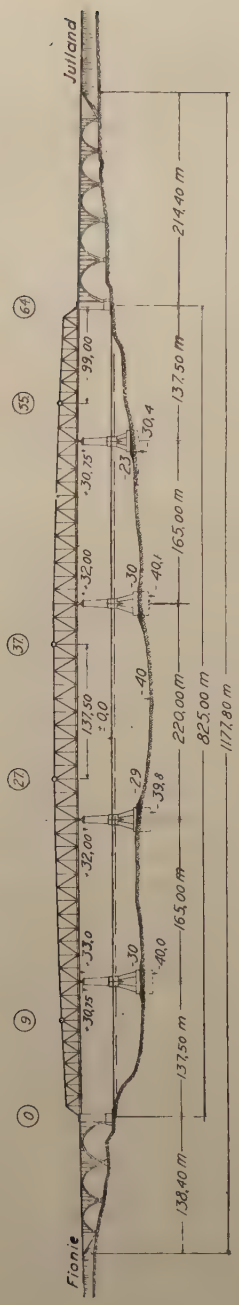


Fig. 289. — The Lillebelt bridge.

long bridge (1) was started in 1929; it was completed and opened to traffic on the 15th May, 1935, since when the journey time from Copenhagen to Jutland has

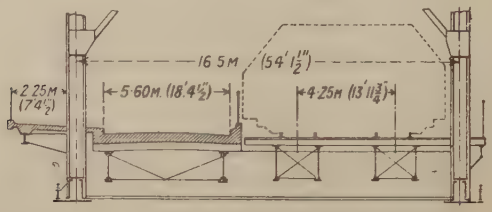


Fig. 290. — Cross section of the Lillebelt bridge.

been considerably reduced, the more so as it coincided with the introduction of fast diesel trains and a general revision of the timetables.

There is now but one ferryboat service left, on this line, between Korsör and Nyborg, and plans are being prepared to bridge this gap so as to do away with it.

BRIDGES OF THE ISLAND OF MASNEDÖ (fig. 291). — The third substitution of a bridge for a ferryboat is to be found on the Copenhagen-Warnemünde line, which

---

(1) On the Jutland side, the Lillebelt bridge has 5 approach bays in reinforced concrete, the total length being . . . . 214.40 m. (703 feet)
And on the Fyn side, 3 similar approach bays . 138.40 m. (454 feet)
The cantilever lattice girder steel bridge over the Belt with spans of 137.50 m. (451 feet), 165 m. (541 feet), 220 m. (723 feet), 165 m. (541 feet) and 137.50 m. (451 feet) totals . . . . 825.00 m. (2 707 feet)
Overall length of the bridge . . . . . 1 177.80 m. (3 864 feet)

will enable the railway to reach the extremity of the Kingdom at Gjedser, leaving but the single Baltic crossing between Gjedser and Warnemünde.

The new bridge will link up the island of Sjaelland with Falster in three stages :

from Sjaelland to the island of Masnedö across the Masnedsund strait;

across the island of Masnedö;

crossing of the Storström, between the islands of Masnedö and Falster, from Vordingborg to Orehoved.

The bridge over the Masnedsund is being built at the same time as that over the Storström, which it will complete, as the little island of Masnedö between Masnedsund and Falster Island has made it possible to build two smaller bridges instead of one large structure with the same traffic capacity.

The Masnedö bridge is 221.30 m. (725 ft. 10 in.) long; it has a clear headway above water level of 5 m. (16 ft. 5 in.) and the 32.80-m. (107 ft. 6 in.) lift span leaves a clear passage of 25 m. (82 feet) for shipping. The other 5 spans measure 37.70 m. (123 ft. 8 in.) each.

The Storström bridge (fig. 291), which was begun in the Spring of 1933, should be completed by the end of 1937 and will be one of the longest bridges in Europe, reaching about 3 156 m. (10 356 feet). It is a road and railway bridge, leaving a clear headway of 26 m. (85 ft. 3 in.) for shipping, and designed to carry 120-ton locomotives, together with a 5.60 m. (18 ft. 5 in.) wide road and a 2.50-m. (8 ft. 2 1/2 in.) footpath (1).

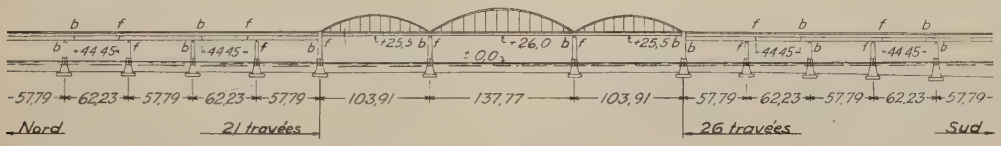


Fig. 291. — The Storström bridge.
Note : travées = spans.

Sund bridges. — Projects are being worked out for bridging the Sund both between Helsingör and Norway and between Copenhagen and Sweden. The scheme seems to be feasible technically. Whether it is financially advisable is another matter.

CHAPTER XLVII.

The Danish Railways.

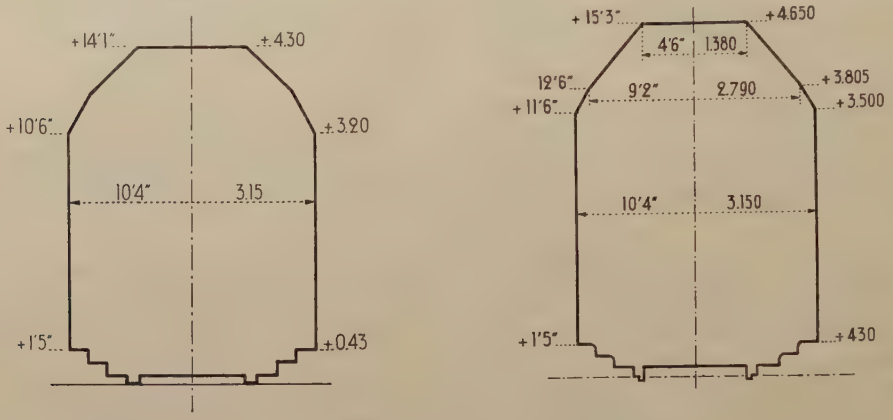
XLVII-1. — General. — Although the gradients on the Danish lines are generally easy, train speeds, until recently, have been low and the time lost in crossing the many straits has had a considerable effect upon the total journey times. As elsewhere, the general economic conditions have forced the railways to improve their services considerably if they were not to fall into total disuse.

(1) For navigation purposes, there are three spans of 103.90, 137.80 and 103.90 m. (341, 452 and 341 feet) . . . . . 345.60 m. (1 134 feet)
Approach spans built as cantilever girders :
Northern side (Masnedö) 21 spans . . . . . 1 250.80 m. (4 104 feet)
Southern side (Falster) 26 spans . . . . . 1 560.00 m. (5 118 feet)
3 156.40 m. (10 356 feet)

TIMETABLES. — In this chapter we have used the 1935/36 Winter timetables.

THE RAILWAY SYSTEM. — The total length of the railway system on the 1st April 1934 was 5 182 km. (3 220 miles), about half belonging to the State and half to private companies, actually 2 509 km. (1 559 miles) and 2 673 km. (1 661 miles) respectively (excluding ferryboat routes) (1).

These are all standard-gauge lines except for 143 km. (88-9 miles) belonging to the *Haderslev Amts Jernbaner* and the *Bornholmske Jernbaner*, which are metre gauge.



Former loading gauge for 4' 8 1/2" track. New loading gauge for 4' 8 1/2" track.

Fig. 292. — Danish railway loading gauges.

Figure 292 shows the old and new loading gauges applying to all the standard and to the 3 ft. 6 in. gauge lines.

Although the State system is partly composed of lines taken over from private companies, it is practically impossible to draw conclusions of any value from a comparison of the State lines and those operated by private companies.

In FALSTER ISLAND, for instance, the State owns but a single railway, the main North to South international line, and the important neighbouring island of LOLLAND, all railways without exception — 223 km. (138.6 miles) in all — are privately owned (2).

The main East to West line branches off the *State* system at Nykjöbing, in the neighbouring island, and ends at Nakskov, a secondary centre of some importance where through coaches from Copenhagen run to. Even so, these through services are poor, which is unavoidable

(1) The first railway in Denmark was the Copenhagen-Roskilde, opened to traffic in 1847 by the *Sjaelland Company*, and since incorporated in the State system.
The State built its first railway — between Aarhus and Renders — in 1862.

(2) As follows :

Lolland Company	137 km. (85.1 miles)
Nakskov-Kragenaes	27 km. (16.8 miles)
Nyköbing-Stubbekjöbing and branch . .	58 km. (36.0 miles)

as all Lolland railways are secondary lines.

In Fyn, the situation is as complex as the State owns but two through lines linking up with the adjoining islands by ferryboats; the Nyborg-Middlefart main line and the Tommerup-Assens branch. All others — aggregating some 400 km. (250 miles) — are operated by private Companies. One of these, the *Sydfinske Jernbaner* (1) with 218 km. (135.5 miles) of lines, also operates two ferryboat services to the neighbouring islands of Langeland and Als. The first, 17 km. (10.6 miles) long, extends its Odensee-Svendborg railway (47 km. = 29.2 miles) to Rudkjöbing; the second, 24 km. (14.9 miles) long, prolongs the Odensee-Faaborg railway (52 km. = 32.3 miles) as far as Mommark, where a *State Railways* Jutland line starts from.

The situation is different again in Jutland and Sjaelland, where the *State Railways* operate proper systems, although private Companies also work some important lines, such as the *Copenhagen-Slangerup Railway*.

As might be expected, through trains are run over the more important private lines, but as these are never first-class lines, the overall speeds remain just below 60 km. (37.3 miles) an hour, the average speed of the local trains being barely half as much. Nearly all railways use rail motor cars.

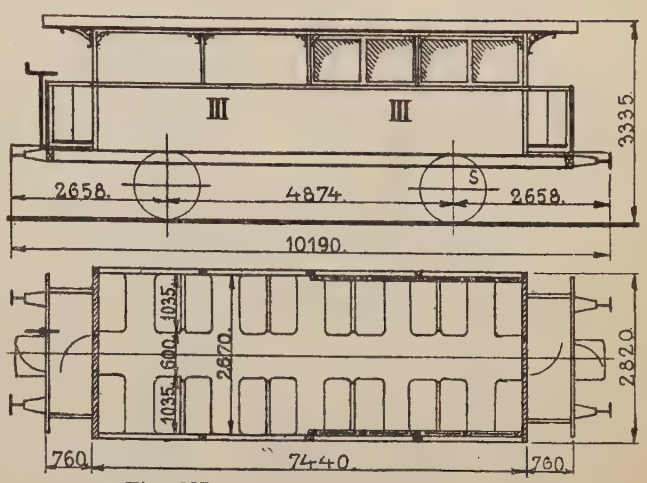


Fig. 293. — *Danish State Railways'* open carriages.

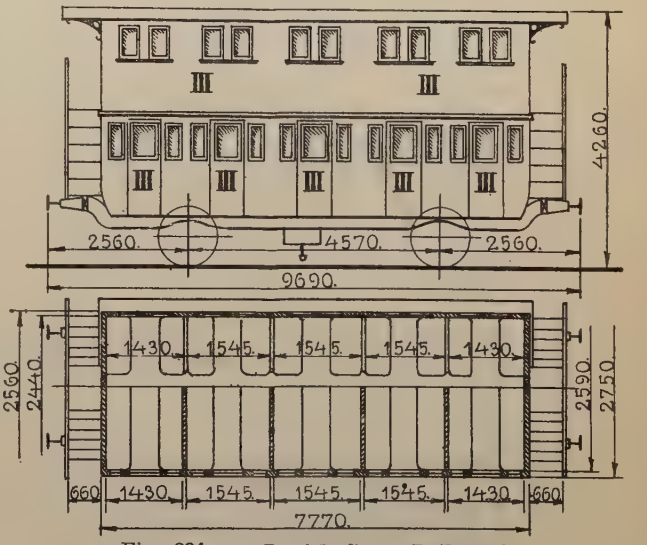


Fig. 294. — *Danish State Railways'* double-deckers.

XLVII-2. — **Electric traction.** — Traffic on the Copenhagen suburban North Coast and the Hellerup lines, has been heavy for a long time. This has been met by using special large-capacity stock, including a number of open coaches (fig.

(1) *South Fyn Railways.*

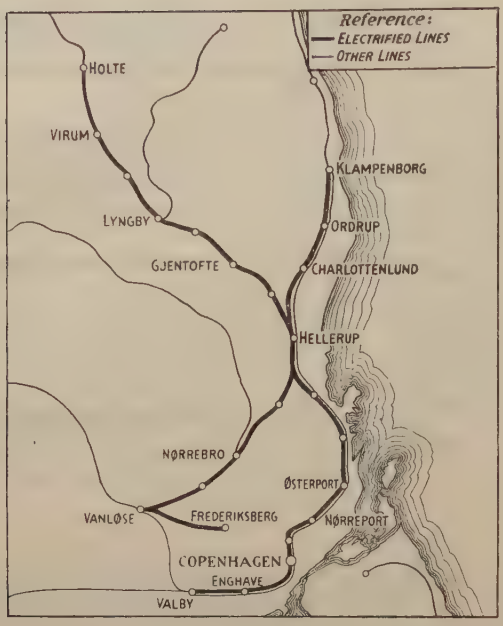


Fig. 295 (*). — Copenhagen suburban railways.

293) (1), and double deckers (2) (fig. 294). This obsolete rolling stock will not be replaced when taken out of service, which will still further reduce the number of railways using double deckers.

Since the 1934 Summer, the Copenhagen district suburban lines have been operated electrically on 1 500-volt continuous current (fig. 295) by means of 49-ton motor coaches with 37-ton trailers, to which weight must be added 15.75 tons for the 235 passengers. The electric system is made up as follows :

Valby-Copenhagen-Hellerup-Klampenborg .	17.2 km.	(10.7 miles)
Frederiksberg-Hellerup .	10.4 km.	(6.5 miles)
Hellerup-Holte . . .	11.1 km.	(6.9 miles)

And the Valby-Vanlose-Ballerup 14 km. (8.7 miles) suburban section is soon to be electrified (3).

The Valby-Klampenborg line follows German practice in the sense that it starts outside the capital, which it crosses, and ends beyond it. It is laid alongside the pre-existing non-electrified lines, over which other traffic is worked.

Electric trains run at 20-minute intervals, safe on Sundays, and during rush hours, when the headway is reduced to 10 minutes. The average speed is as follows :

TABLE 272.

SUBURBAN ELECTRIC SERVICES.

RUN.	Distance.		Time spent.	Number of stops.	Overall speed.	
	Km.	Miles.			Km. h.	M. p. h.
Valby-Copenhagen-Klampenborg . .	17.2	10.7	0.28	11	36.9	22.9
Frederiksberg-Vanlöse-Klampenborg .	...	...	0.24	7	46.5	28.9
(Frederiksberg) Hellerup-Holte . . .	11.1	6.9	0.21	3	31.7	19.7

(1) The first coaches of this type with 40 third-class seats and a tare weight of 10 100 kgr. (22 260 lb.), i.e. 251 kgr. (551.5 lb.) per seat, were built between 1855 and 1897 by *Atlas*, *Kochum* and *Scandia*, and the more recent, in 1896, by the *Strömmen* Works.

(2) These coaches provide 90 third-class seats; those of 1877 were built by the *Wagenbau*, those of 1886-87 at *Breslau*, and those of 1900-01 at *Maribo*.

(3) It is expected that, the work being started in April 1936, it will be completed by 1939.

XLVII-3. — **Diesel traction** (fig. 296). — Few countries have done as much to develop the diesel engine as has Denmark which introduced them on both its mari-

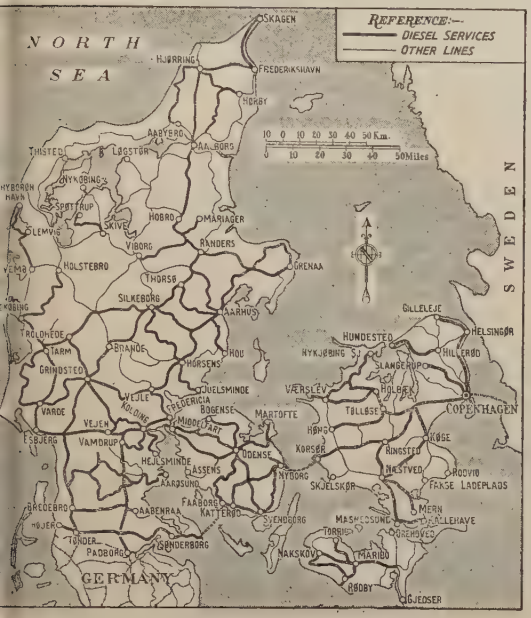


Fig. 296 (*). — Danish system worked by diesel railcars or locomotives, built by the *Frichs Works*, Aarhus.

time and railway services, the latter including three categories of vehicles :

diesel locomotives;
rail motor cars of all sizes;
and triplet sets for fast services.

The first diesel engines were imported from Germany but the Danish railways now purchase them from Frichs (of Aarhus) and from Burmeister & Wain. The first firm, in particular, has built a great number of them, not for Denmark only but also for abroad.

In this matter private Companies took the initiative. The first diesel locomotive was bought by one of them in 1925, and the first railcars the following year. These all had Atlas engines. The *State Railways'* orders were placed outright with local firms; in 1927 they ordered six locomotives with Frichs engines, and in 1928 four railcars, also with Frichs engines. Since then, other orders have followed, so that railcars are now to be found on all the private railways, two thirds of such vehicles being diesels, and the rest petrol, generally double bogie cars with 150-h.p. engines. Towards the end of 1934, private Companies owned 66 railcars.

During the same period, the *State Railways* purchased 30 railcars, 12 locomotives, and 12 tractors, besides four diesel car rakes.

No further steam locomotives are to be ordered in future, as the diesels in spite of inevitable shortcomings at first, have since given satisfaction.

a) Diesel-electric locomotives. — Many such locomotives are to be met with both on private Companies and State railways.

The first diesel locomotive, fitted with a 120-h.p. Atlas engine, was purchased by one of the private Companies in 1923; three others with Atlas or Holeby engines, and a further three Frichs-engined, in 1926. Since then, Danish engines, generally Frichs and occasionally Burmeister & Wain, have been exclusively used both by the private Companies and by the *State*.

The 1 000-h.p. express locomotives (fig. 297) are similar to those supplied to Siam by the same builder, but the latter

(*) Map reproduced from *The Railway Gazette*.

TABLE 273.

A FEW FEATURES OF DANISH DIESEL LOCOMOTIVES.

Date.	Wheel arrangement.	Horse-power.	Speed.		Weight.		Service	Railway (and number of units).	Engi
			Km./h.	M. p.h.	Metr. t	Engl. t.			
1923	0—2—2 +2—2—0	120	...	...	34	33.5	Passenger.	Company (1).	Atla
1926	Do.	150	...	...	38	37.4	Do.	Company (3).	Atla 2 Hol
1926	Do.	230	60	37.3	38	37.4	Do.	Hads Herred (1).	Fricl
Do.	Do.	Do.	Do.	...	44	43.3	Do.	Ringköbing Ornhoj-Holstbro(2).	Do
1927	Do.	265	60	37.3	38	37.4	Do.	Naestved Proestö Mern (1).	Do
Do.	Do.	Do.	70	43.5	44	43.3	Do.	Danish State (6).	Do
1928	Do.	300	60	37.3	42	41.3	Do.	Skive Vestsalling (1).	Do
1931	Do.	330	60	37 3	44	43.3	Do.	Mariager Faarup Viborg (1).	Do
1929	4—4—2	500	100	62.1	55	54.1	Rapide.	Danish State (2).	Do
1934	Do.	330	75	46.6	40	39.4	Passenger.	Hjörring Hirtshals (1).	Do
1931	4—8—4	1 000	120	74.6	96	94.5	Rapide.	Danish State (2).	Do
1932	2—2+2—2	330	75	46.6	40	39.4	Passenger.	Hjörring Aabybro (2).	Do
1932	2—4—0	225	70	43.5	30	29.5	Do.	Hörve Voeslev (1).	Do
1932	2—6—2	415	80	49 7	47	46.3	Do.	Ods Herred (1).	Do
								Höng Tölöse (1).	Do
								Troldhede Kolding Vejen (1).	Do
								Horsens Juelsinde (1).	Do
1934	Do.	450	80	49.7	48	47.2	Mixed.	Aalborg Ry. (1).	Do
1935	Do.	Do.	70	43.5	48	47.2	Do.	Bornholm Ry. (1).	Do
1934	Do.	550	80	49.7	48	47.2	Do.	Skagenbanen (1).	Do
1934	Do.	450	85	52.8	49	48.2	Passenger.	Lolland-Falster (1).	Do
1932	6—0—0 +0—4—0	415	75	46.6	47	46.3	Do.	Hilleröd Fredriksvoerk (1).	Do
1932	2—4—2	275	75	46.6	40	39.4	Do.	Varde Nörre Nebel (1).	Do.
1933	...	200	...	...	28	27.6	...	Company.	Burmei
	...	350	...	...	48	47.2	...	Do.	& Wa

only weigh 80 t. instead of 96, with a maximum speed of 75 km. (46.6 miles) an hour.

In 1934, 12 diesel locomotives with an adhesive weight of 50.9 Engl. tons — about half the total 100.4 Engl. tons — operated a number of expresses.

At the end of the year 1934/1935, the private Companies owned 29 diesel locomotives, whose power ranged from 150 to 450 H.P. and whose maximum speed ranged from 45 to 75 km. (28 to 46.6 miles) an hour.

For purposes of comparison, the following table gives the leading dimensions of the Danish and Siamese locomotives.

The Danish locomotives are able to haul 250 tons at a speed of 110 km.

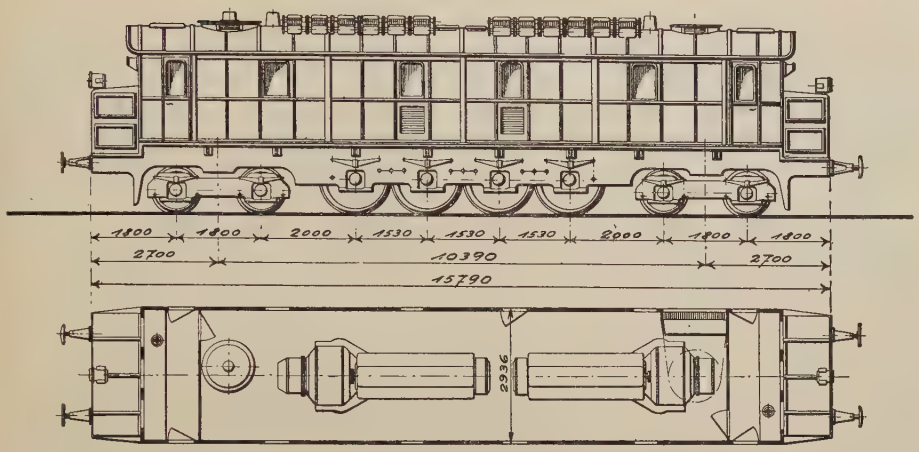


Fig. 297. — 900/1 000-h.p. diesel locomotive, built in 1932 by the *Frichs Works*, Aarhus.

Table 274.

Frichs diesel locomotives.	Danish.	Siamese.
Wheel arrangement	4-8-4	4-8 + 8-4
Length of body	15.790 m. (51′ 9 11/16″)	20.080 m. (65′ 10 9/16″)
Total wheelbase	13.990 m. (45′ 10 3/4″)	17.60 m. (57′ 9″)
Rigid do.	4.59 m. (15′ 11/16″)	2 × 3.70 m. (12′ 1 11/16″) or 10.50 m. (34′ 5 7/16″)
Bogie wheelbase	1.80 m. (5′ 10 7/16″)	1.80 m. (5′ 10 7/16″)
Distance between bogie centres.	10.39 m. (34′ 1″)	15.98 m. (52′ 5 3/16″)
Diameter of driving wheels	1.404 m. (4′ 7 9/32″)	1.05 m. (3′ 5 3/8″)
Engines, number	4	8
Do. horse-power	1 000	1 600 max.
Maximum speed	110 km./h. (68.4 (m.p.h.)	75 km./h. (46.6 m.p.h.)
Weight in service	102 m. t. (100.4 Engl. t.)	126 m. t. (123 Engl. t.)
Do. adhesive	51.7 m. t. (50.9 Engl. t.)	88 m. t. (86.6 Engl. t.)

(68.3 miles) an hour. During their trials, they hauled rakes of 11 bogie coaches weighing some 350 tons.

b) Diesel tractors. — The first tractor was built for the State Railways by Schwartzkopff, of Berlin, in 1931. Since then the Frichs Works supplied 5 tractors in 1933, and 6 in 1935, besides a couple for the *Aarhus-Hommel-Thors Railway*. They all have mechanical transmission and two pairs of wheels; with 65 to 78 horse-power, they weigh 12 to 14 tons, and reach a maximum speed 30 km. (18.6 miles) an hour.

Frichs has also supplied the 125-h.p.

tractors with electrical transmission to the *Hodersley*, the *Bornholm*, and the *Hjörring Hirthals Railway Companies*. These units weigh 15 tons; their maximum speed is 40 km. (25 miles) an hour.

c) RAILCARS. — Owing to the light track of the Danish railways, railcars are, with few exceptions, bogie vehicles. Even so, some of them weigh rather more than sound practice would advise and attempts are being made to lighten this stock.

Since 1931, 6-wheeled bogies have generally been used instead of 4-wheeled, only the outer pairs of wheels of each bogie being driven. Table 275 clearly shows the wheel arrangement, and the progress made in increasing power and speed, and in weight reduction.

TABLE 275.

A FEW FEATURES OF DANISH RAILCARS.

Date built.	Horse-power.	Speed.		Weight.		Passengers carried.	RAILWAY.	Engine
		Km./h.	M. p.h.	Metr. t.	Engl. t.			
							P-P + M TYPE	
1933	125	60	37.3	18	17.7	38	Vejle Vandel Grinsted (1).	Frichs.
							P-P + M-M TYPE.	
1924	90	...	...	39	38.4	40	Company (2).	Atlas. Holeby
1926	Do.	...	...	16	15.7	50	Company.	Atlas.
1927	150	...	...	40	39.4	54/86	Company (3).	Maybach
1928	180	90	55.9	42	41.3	60	Danish State (6).	Frichs.
				38	37 4	60	Troldhede Kolding Vejen (1).	Do.
							P-P + M-M + P-P TYPE.	
1932	300/330	...	...	55	54.1	72	Sydfinske (8). Companies (5).	B & W.
							P-P-P + M-P-M TYPE.	
1931/32	225	90	55.9	44/40	43.3|39.4	40	Companies (4).	Frichs.
1934	320	60	37.3	37.5	36.9		Haderslev district (2).	Do.
1935	550	120	74.6	42	41.3		Danish State (2).	Do.
1932	275	100	62.1	52	51.2	70	Danish State (4).	Do.
	Do.	90	55.9	49	48.2		Nordfynske (1).	Do.
	Do.	90	55.9	50	49.2	70	Hads Herred (1).	Do.
1934	480	120	74.6	54	53.1	64	Danish State (10).	Do.
1935	275	70	43.5	42	41.3		Bornholm Island (2).	Do.

The first unit mentioned is the only one with mechanical transmission, and is designed for speeds of 12, 25, 40, and 60 km. (7.5, 15.5, 25.0 and 37.3 miles) an hour in each direction (fig. 298). It can haul a 30-ton trailer up 1 in 100 gradients at a speed of 25 km. (15.5 miles) an hour.

The 2nd group does not call for any comment; it comprises experimental designs.

The 3rd group is unique in Europe. In order to reduce vibration the engine is carried on the central bogie, under the floor, where it is unfortunately less accessible (fig. 299).

The 4th group includes the final designs; the increase in the power of these vehicles should be noted.

The ten *State Railways* 54-ton railcars can haul at existing timings trailers weighing up to 80 tons. They are shown

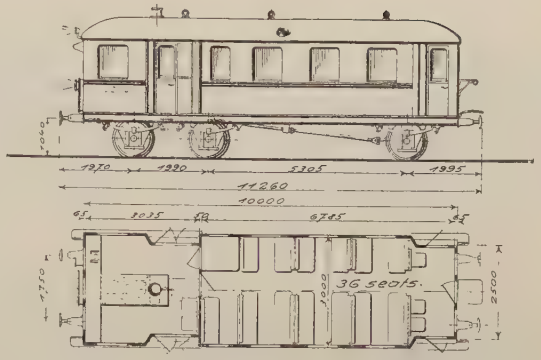


Fig. 298. — 115/125-H.P. diesel-mechanical railcar, built by the *Frichs Works*.

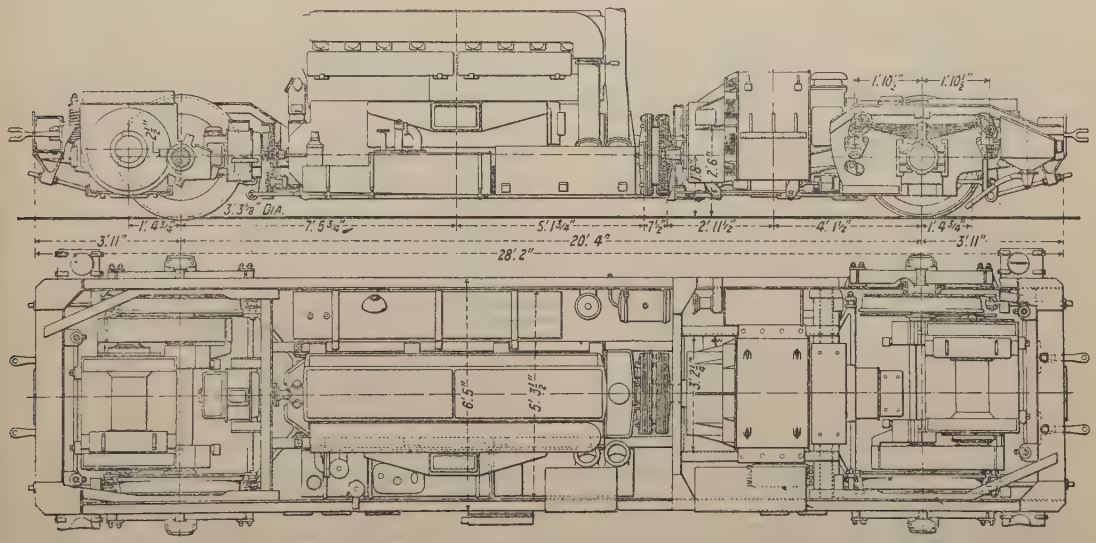


Fig. 299. — Centre bogie of the *Sydfinske Railway*'s diesel railcar, built by *Burmeister & Wain*.

by the letters MI in the timetables (fig. 301).

Finally, the *Hads Herred Railway*'s rail car is an elaboration of the vehicles supplied by Messrs. Frichs to Siam and elsewhere; the engine portion and cab can be detached from the rest of the vehicle, so that repairs can be carried out without having to take the vehicle itself out of service.

d) TRIPLET RAKES (fig. 302). — In accordance with the logical development of their diesel railcars, the *State Railways* purchased from Messrs. Frichs, of Aar-

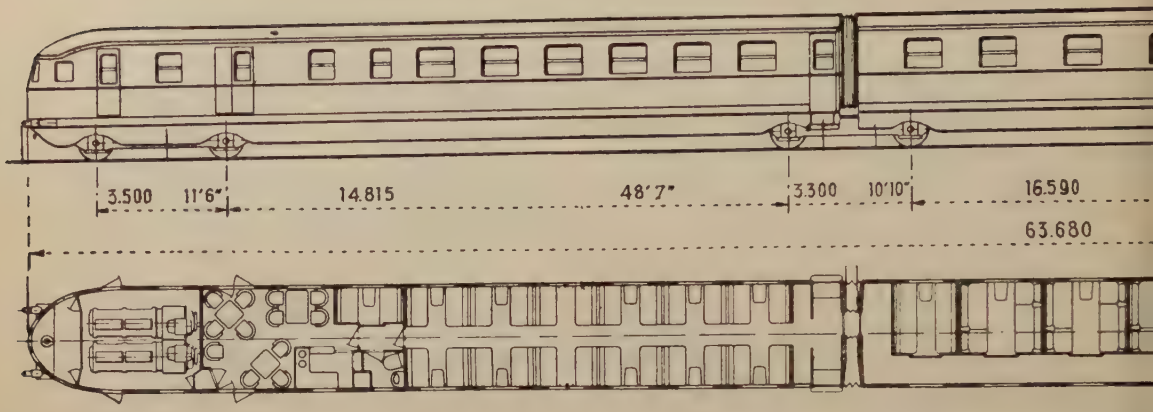


Fig. 302. — Triplet diesel rake, built for

hus, 4 units, each consisting of 3 bodies as follows :

Leading unit. — Driving compartment and engine.
Restaurant compartment with 12 seats.
Third-class compartment with 28 seats.

Intermediate vehicle. — At each end, 2 third-class compartments with a total of 16 seats.
In the centre 6 first-class compartments with a total of 36 seats.

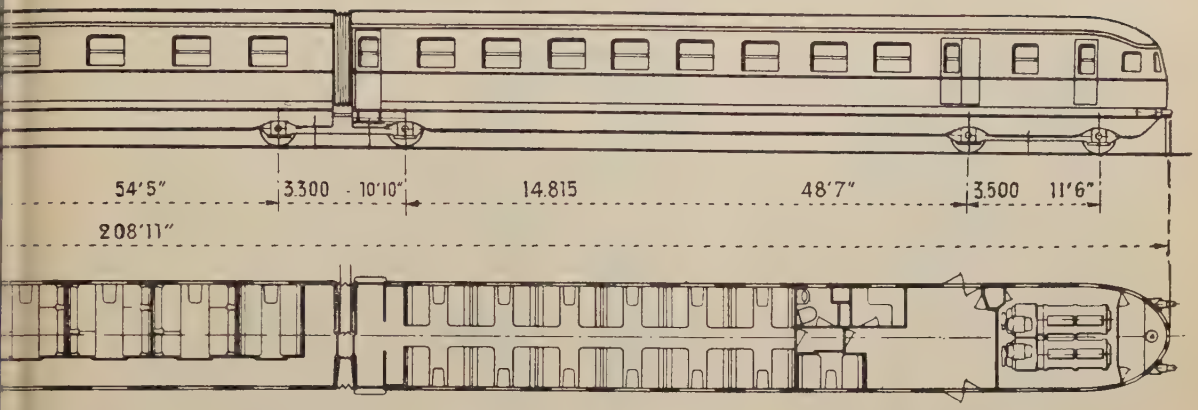
End vehicle. — Third-class compartment with 46 seats.
Luggage compartment.
Driving compartment and engine.

The design was inspired by the German trains and the Dutch rakes. Like the latter, the Danish rakes have two nose-suspended electric motors on the inner bogies; the engines, in accordance with Frichs' usual practice, are carried on the outer bogies. The bodies of the units are supplied by *Scandia* and the electrical equipment by the *Titan* Works, of Copenhagen.

Table 276 gives comparative information on the Danish and Dutch rakes.

TABLE 276.

TRIPLET RAILCARS.	Danish.	Dutch.
Total length	63.680 m. (208′ 11″)	...
Width	2.864 m. (9′ 4 3/4″)	...
Weight	118 m. t. (116.1 Engl. t.)	90 m. t. (88.6 Engl. t.)
Seats, compartments	140	160
Do. restaurant	12	...
Engines, number	4	2
Horse-power, total	1 100	820
Do. per ton	9.35	9.1
Do. per seat	7.24	5.13
Weight per seat	3 480 kgr. (7 672 lb.)	2 510 kgr. (5 533 lb.)
Maximum speed	120 km./h. (74.6 m.p.h.)	150 km./h. (93.2 m.p.h.)



Danish State Railways, by the *Frichs Works*, Aarhus.

Thanks to these units, the timings of the express trains have been markedly improved. Their success has been so great that orders for quadruplet units — the maximum number the ferryboat tracks will take — have been placed.

XLVII-4. — **The sleeping-car and restaurant-car services** are operated by the *International Sleeping-Car Company* which holds the monopoly of such services in Denmark.

No « de luxe » train has ever been run in Denmark. Latterly, however, a sleeping-car service from Copenhagen links up with the « Nord Express » at Hanover and goes on to Paris.

The through sleeping-cars are, when necessary, ferried over the straits and, generally speaking, are the only passenger vehicles so dealt with, most of the ordinary stock not being carried across.

XLVII-5. — **Train speeds** (fig. 303). — The relatively small gradients on the greater part of the railway system present no obstacle to maintaining the desired speeds.

In Sjaelland, where the maximum gradients reach but 1 in 200, *Atlantics* are used and in Fyn and Jutland, with 1 in 100 gradients, *Pacifics*.

The maximum speed is 100 km. (62 miles) an hour; the weight of the passenger trains reaches 400 t. (394 Engl. tons).

Fast goods and parcels trains have a maximum speed of 80 km. (50 miles) an hour over parts of the main lines, with trains reaching 800 t. (788 Engl. tons) in weight.

If the introduction of the 10 fast diesels in 1934 marked a noteworthy stage in the necessary acceleration of the Danish trains, the putting into service of « Lyntog » (lightning) trains was the occasion of a complete reform in the timetables and made it possible to reduce by one third the journey time between Copenhagen and important Jutland towns. This had a happy effect on the international service from London to Copenhagen. By leaving London a little earlier the saving of 2 3/4 hours due to the diesel rakes and the use of the Little Belt bridge made it possible to reach Copenhagen late the next day, thus spending one night only, instead of two, on the way.

The transfer by ferryboat slows down

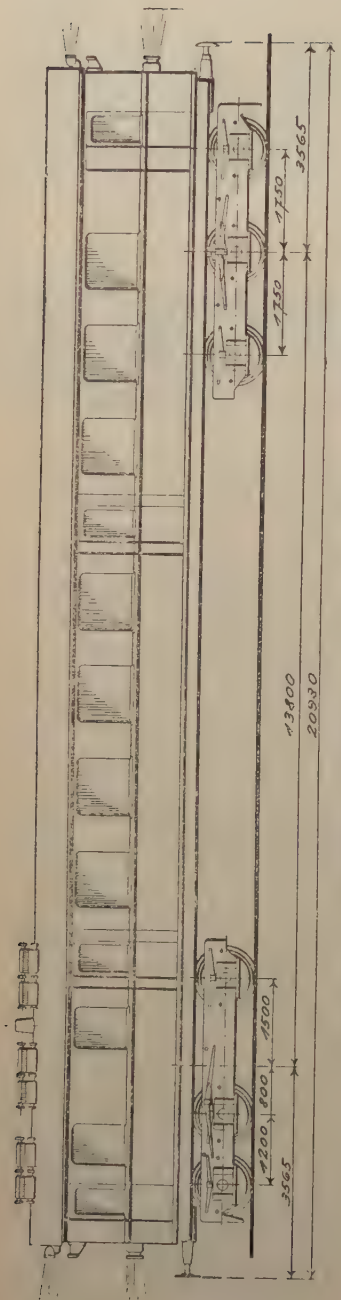


Fig. 300. — 270/275-H.P. diesel-electric railcar, built by the *Fréchs Works*.

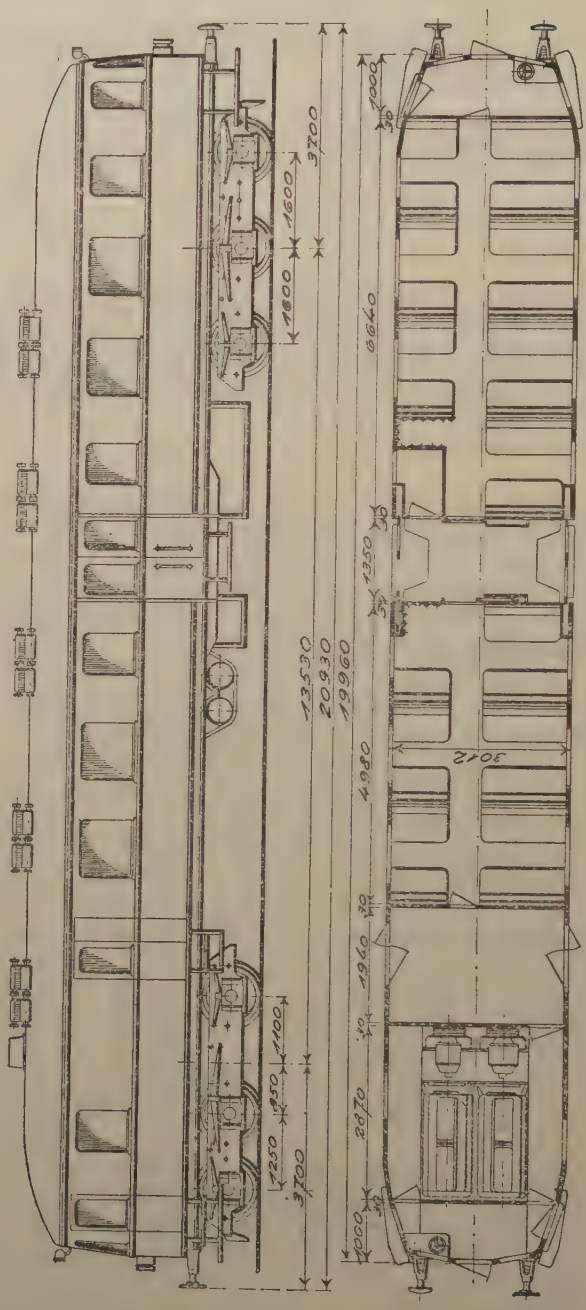


Fig. 301. — 440/480-H.P. diesel-electric railcar, built by the *Fréchs Works*.

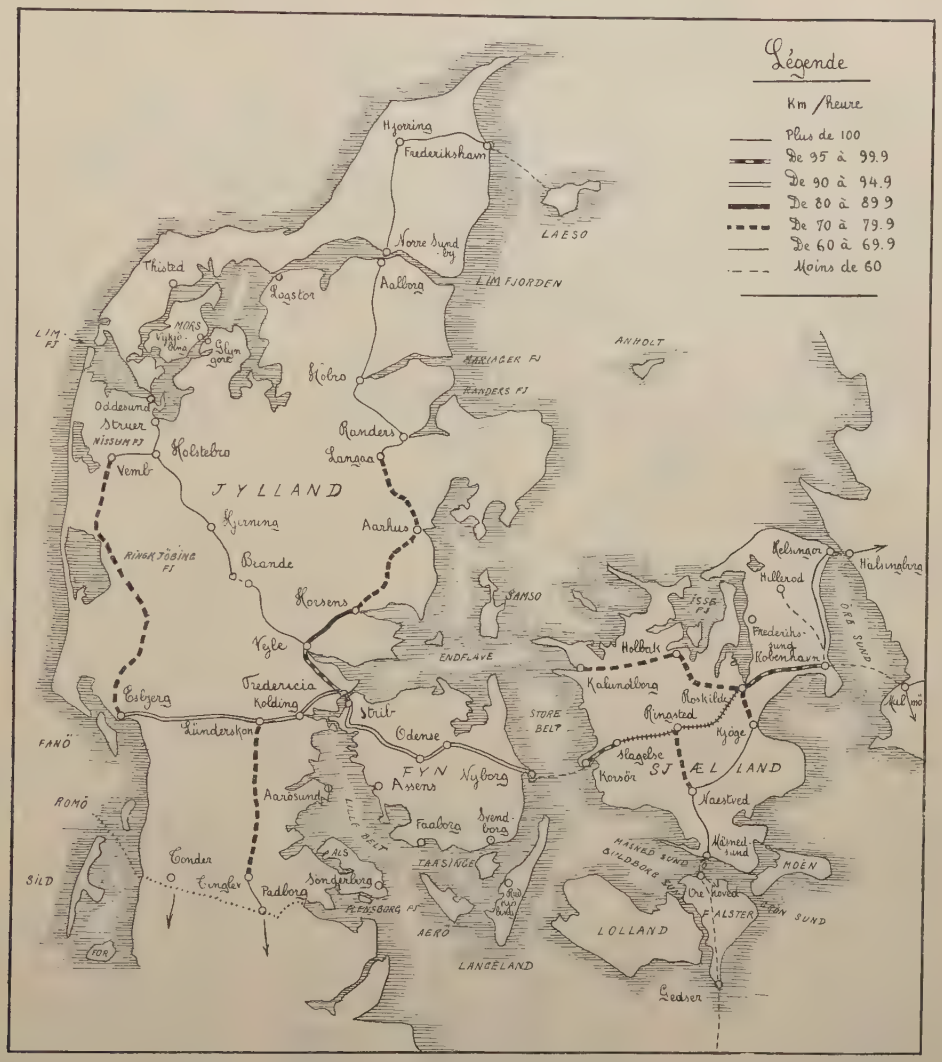


Fig. 303. — Cartogram of maximum overall speeds maintained on the Danish Railways by steam trains and fast diesels during the 1935/36 Winter.

many journeys, by the slow sea passage, and by the time lost embarking and disembarking the rolling stock from the ferries; this time varies from one port to another.

Thus between the arrival of the train and the departure of the ferry, 10 minutes elapse at Masnedö, 13 minutes at Orehoved, 14 minutes at Korsör, and formerly 13 minutes at Strib and 15 at Fredericia.

In the other direction 13 minutes are required at Masnedö, and Orehoved, 14 at Korsör, and nearly 19 at Nyborg. It used to take 14 minutes at Strib and 15 at Fredericia.

Table 277.

NOTEWORTHY DANISH TRAIN RUNS (fig. 303).

(Non-stop runs are shown in **heavy type.**)

RUN.	Distance. Km.	Distance. Miles.	Time of departure.	Time spent.	Number of stops.	Speed. Km./h.	Speed. Miles/h.	—
Electric traction.								
(Copenhagen) Nörrebro-Hellerup-Klampenborg	10	6.2	7.23 a. m.	0.15	4	40.0	24.9	Suburban train.
(Copenhagen) Nörrebro-Hellerup-Holte	16	9.9	6.03 a. m.	0.25	5	38.4	23.9	Do.
Steam traction.								
Copenhagen-Hilleröd-Helsingör	58	36.0	6.24 a. m.	1.25	10	40.9	25.4	5-min. stop.
Copenhagen-Osterbro-Rungsted-Helsingör.	44	27.3	7.18 a. m.	0.38	...	69.5	43.2	Kystban.
Do.	Do.		6 19 a. m.	1.06	10	43.0	26.7	Suburban train.
Copenhagen H. - Roskilde-Köge-Vordingborg (Nykjöbing)	122	75.8	7.35 a. m.	1.53	4	64.7	40.2	Towards Nakskow
Copenhagen H. - Köge - Gedser (Warnemünde)	178	110.6	...	...	...	...	...	
Copenhagen H.-Ringsted-Gedser (Warnemünde)	176	109 4	10.30 a. m.	3.08	4	56.2	34.9	1 ferry crossing
Copenhagen H.-Naestved	91	56.5	Do.	1.13	...	74.7	46.4	(Berlin).
Do. -Masnedsund	120	74.6	R 4.30 p. m.	1.44	...	69.2	43.0	Towards Berlin.
Do. -Masnedö	130	80.8	R 4.05 a. m.	1.56	...	67.2	41.8	Do.
Orehoved-Gedser	46	28.6	R 2.55 p. m.	0.47	...	58.7	36.5	Berlin.
Gedser-Warnemünde	45	28.0	2.00 p. m.	2.05	...	21.6	13.4	Ferry towards Berl
Copenhagen H.-Aarhus	200	124.3	...	8.00	...	25.0	15.5	Boat.
Copenhagen H. - Roskilde - Kalundborg-Aarhus	271	168.4	9.55 a. m.	5.59	4	45.1	28.0	Mixed, rail and bo
Copenhagen H.-Kalundborg	111	69.0	Do.	1.45	2	63 4	39.4	Train boat.
Roskilde-Holbaek	36	22.4	10.31 a. m.	0.30	...	72.0	44.7	Do.
Holbaek-Kalundborg	43	26.7	11.03 a. m.	0.37	...	70.0	43.5	Do.
Kalundborg-Aarhus	160	99.4	11.51 a. m.	4.03	1	39.5	24.5	Boat.
Kalundborg-Havn-Koldby Kaas	80	49.7	Do.	1.50	...	...	...	Do.
Copenhagen H.-Fredericia	243	151.0	1.30 a. m.	4.15	4	56 8	35.3	Towards Aarhus. 1 ferry.
Copenhagen H.-Korsör	111	69.0	Do.	1.15	...	43.7	27.2	Do.
Korsör-Nyborg	40	24.9	2.52 a. m.	1.18	...	36.8	22.9	Ferry.
Nyborg-Odensee	29	18.0	4.25 a. m.	0.24	...	72.5	45 1	Towards Aarhus
Odensee-Middelfart	49	30.4	4.54 a. m	0.40	...	73.5	45.7	Do.
Middelfart-Fredericia	10.2	6.3	4.35 a. m.	0.10	...	61.2	38.0	Do.
Copenhagen H.-Fredericia-Aarhus	353	219.3	2.53 p. m.	6.52	...	50.1	31.1	Do.
Copenhagen-Slagelse	93	57.8	Do.	1.15	...	74.4	46.2	Towards Aarhus
(Hamburg) Padborg-Fredericia-Frederikshavn	448	278.4	12.33 a. m.	8.06	14	55.0	34.2	Towards Hambur
Tinglev-Kolding	76	47 2	12.47 a. m.	0.58	...	78.6	488.4	Do.
Copenhagen-Fredericia-Frederikshavn	580	360.4	9.14 p. m.	11.25	17	50.8	31.6	
Strib-Fredericia	*10*	*6.2*	*2.07* p. m.	*0.18*	...	*33.3*	*20.7*	Ferry.
Fredericia-Struer	157	97.6	11.10 a. m.	3.05	8	50.9	31.6	...
Copenhagen-Fredericia-Esbjerg	332	206.3	9.14 p. m.	6.17	7	52.8	32.8	Ferries.
Copenhagen-Fredericia-Esbjerg-Struer	478	297.0	Do.	8.47	13	54.4	33.8	Do.
Fredericia-Kolding	21	13.0	2.23 a. m.	0.15	...	84.0	52.3	
Kolding-Esbjerg	68	42.3	2.39 a. m.	0.52	...	78 5	48.8	

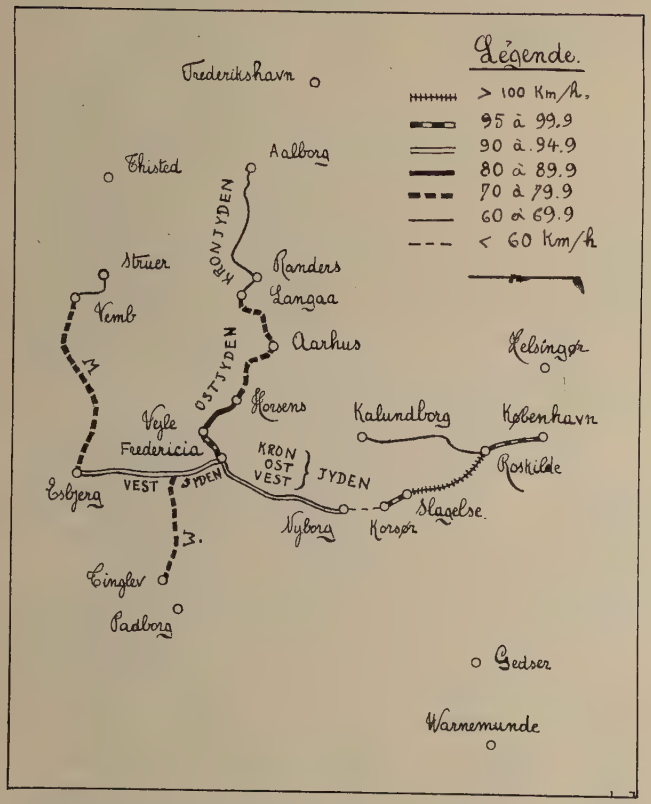


Fig. 304. — Cartogram of maximum overall speeds. Railcars.

Fig. 305. — Cartogram of maximum overall speeds. Electric and steam traction.

TABLE 278.

FAST RAILCAR RUNS (fig. 304).

(Non-stop runs are shown in **heavy type.**)

RUN.	Distance. Km.	Distance. Miles.	Time of departure.	Time spent.	Speed. Km./h.	Speed. Miles/h.	Number of stops.	—
Lyntog (lightning) trains.								
Copenhagen-Fredericia-Aalborg	493	306.3	8.00 a. m.	6.30	75.8	47.1	3	*Kronjyden.*
Copenhagen-Aarhus	353	219.4	8.00 a. m.	4.37	76.5	47.5	1	Ferry L 15
Copenhagen-Korsör	111	69.0	**Do.**	1.09	96.5	60.0	...	Do.
Korsör-Aarhus	242	150.4	9.16 a. m.	3.21	72.2	44.9	...	Ferry Do.
Aarhus-Randers	59	36.7	12.40 p. m.	0.44	78.6	48.8	...	
Randers-Aalborg	81	50.3	1.27 p. m.	1.03	77.1	47 9	...	
Copenhagen-Fredericia-Randers	412	256.0	7.50 a. m.	6.15	65.9	40.9	13	*Ostjyden.*
Copenhagen-Roskilde	32	19.9	**Do.**	0.23	86 1	53 5	...	L 17.
Roskilde-Slagelse	61	37.9	8.14 a. m.	0.36	101.7	63.2	...	
Slagelse-Korsör	18	11.2	8.52 a. m.	1.12	20 0	12.4	...	
Korsör-Nyborg	...	...	9.16 a. m.	1.10	22.3	13.9	...	Ferry.
Nyborg-Odensee	29	18.0	10.40 a. m.	0.19	91.6	56 9	...	
Odensee-Middelfart	49	30.4	11.01 a. m.	0.32	91 9	57.1	...	
Middelfart-Fredericia	10.2	6.3	11.34 a. m.	0.09	90.7	56.4	...	
Fredericia-Vejle H.	27	16.8	11.46 a. m.	0.17	95.3	59.2	...	
Vejle H.-Horsens	32	19.9	12.05 p. m.	0.23	83.5	51.9	...	
Horsens-Skanderborg	29	18.0	12.29 p. m.	0.22	79.1	49.2	...	
Skanderborg-Aarhus	22	13.7	12.52 p. m	0.17	77.7	48.3	...	
Aarhus-Langaa	46	28.6	1.15 p. m.	0.36	76.6	47.6	...	
Langaa-Randers	13	8.1	1.53 p. m.	0.12	65.0	40 4	...	
Copenhagen-Fredericia-Esbjerg	331	205.7	11.45 a. m.	4.31	73 3	45.5	2	Vestjyden L 16.
Copenhagen-Korsör	111	69.0	**Do.**	1.14	90.0	56.0	...	Do.
Fredericia-Esbjerg	89	55.3	3.18 p. m.	0.58	92.1	57.2	...	
Other services.								
Copenhagen H.-Kalundborg	111	69.0	10.20 a. m.	2.04	52.1	32.4	12	M 167
Copenhagen-Fredericia (Padborg)	243	151.0	10.16 a. m.	4.14	56.9	35.4	4	MI 87
Copenhagen-Korsör	111	69.0	**Do.**	1.32	72.4	45.0	..	Hamburg.
Odensee-Fredericia	63	39.1	1.48 a. m.	0.42	90.0	56.0	...	Duplicates the E Struer train
Copenhagen H.-Korsör	111	69.0	R 11.55 p. m.	1.22	81.2	50.5	4	MI 1096.
(Padborg) Tinglev-Fredericia	96	59.7	7.46 a. m.	1.21	71.1	44.2	4	MI.
Fredericia-Aarhus	110	68.4	9.15 a. m	1.41	65.3	40.6	3	MI 931.
Randers-Aalborg	81	50.3	11.23 p. m.	1.09	70.4	43.7	1	MI 977.
Aarhus-Aalborg	140	87.0	5.45 a. m.	2.27	57.1	35 5	4	MI 912.
(Fredericia) Esbjerg-Struer	146	90.7	4.23 p. m.	2.12	67.3	41.8	5	MI 380.

MIXED RAILWAY AND FERRYBOAT JOURNEYS. — We have quoted the chief of these combined journeys (Copenhagen to Warnemünde, Esbjerg, and Aarhus) with particulars of the different sections, in order to bring out the resulting loss of speed.

FAST LINES. — The section with the heaviest traffic is that from Copenhagen to Roskilde. At this station the line splits up into three branches : to Kalundborg (for Aarhus), to Fredericia (for Jutland), and to Naestved for the South.

There is an alternative route between Roskilde and Naestved, with only 2 km.

Table 279.

FASTEST NON-STOP RUNS.

RUNS.	Distance. Km.	Distance. Miles.	Time of departure.	Time spent.	Speed. Km./h.	Speed. Miles/h.	—
a) Trains.							
(Copenhagen) Fredericia-Kolding	21	13.0	2.23 a. m.	0 15	84.0	52.2	
(Padborg) Tinglev-Kolding	76	47.2	10.47 a. m.	0.58	78.6	48.8	
(Fredericia) Kolding-Esbjerg	68	42.3	2.39 a. m.	0.52	78.5	48.7	Berlin.
Copenhagen-Naestved	91	56 5	10.30 a. m	1.13	74.7	46.4	Aarhus.
Do. -Slagelse	93	57.8	2.53 p. m.	1.15	74.4	46.2	Do.
(Copenhagen) Odensee-Middelfart	49	30.4	4.54 a. m.	0.40	73.5	45.7	
b) Railcars.							
(Copenhagen) Roskilde-Slagelse	61	37.9	8.14 a. m.	0.36	101.7	63.2	Ostjyden.
Copenhagen-Korsör (service stop)	111	69.0	8.00 a. m.	1.09	96.5	60.0	Kronjyden.
(Copenhagen) Fredericia-Vejle H.	27	16.8	11.46 a. m.	0.17	95.3	59.2	Ostjyden.
(Do.) Middelfart-Fredericia	14	8.7	11.34 a. m.	0.09	93.3	58.0	Do.
(Do.) Odensee-Middelfart	49	30.4	11.01 a. m.	0.32	91.9	57.1	Do.
(Do.) Nyborg-Odensee	26	16.2	10.40 a. m.	0.19	91.6	56.9	Do.
(Do.) Fredericia-Esbjerg	89	55 3	3.18 p. m.	0.58	92.1	57.2	Vestjyden.
(Do.) Slagelse-Korsör	18	11.2	8.52 a. m.	0.12	90.0	56.0	Ostjyden.
(Copenhagen) Odensee-Fredericia	63	39.1	1.48 a. m.	0.42	90.0	56.0	MI 87.
c) Ferryboat passages.							
Korsör-Nyborg	26	16.2	...	1.10	22.3	13.9	10 daily.
Masnedö-Orehoved	3.5	2.2	...	0.18	11.7	7.3	12 do.
Strib-Fredericia	2.8	1.7	...	0.15	12.0	7.5	
Copenhagen-Malmö	27.7	18.5	...	1.30	20.0	12.4	4 do.
Helsingör-Hälsingborg	5.1	3 2	...	0.20	15.0	9.3	5 do.
Gedser-Warnemünde	44.5	27.7	...	1.55	23.5	14.6	
Faaborg-Mommark	24.0	14.9	...	1.20	18.0	11.2	Company—6 daily.
Svendborg-Rudkjöbing	18.0	11.2	...	...	...	...	Do. 4 do.
Assens-Aarösund	14.0	8.7	...	...	...	..	Do. Met. gauge.

(1.2 miles) difference in length in favour of the Ringsted as against the Kjöge railway. In order to serve the latter, express trains from Nykjöbing and the island of Lolland are routed that way.

Except in Jutland, the length of the runs is limited when a ferryboat crossing is involved. Thus although the timetables show a non-stop run between Korsör and Aarhus, the articulated train which makes this run has to stop at Nyborg to leave the ferry which has brought it from Korsör.

In the same way, the Esbjerb « Lyntog », when running between Copenhagen and Fredericia, has to stop at Korsör at 12.59 p.m. besides stopping at Nyborg when leaving the ferry. The non-stop run in last Summer's timetables included a service stop outside Fredericia to reverse the rake as there is no junction by which the run into Fredericia can be avoided.

TABLE 280.

LONGEST NON-STOP RUNS.

RUNS.	Distance. Km.	Distance. Miles.	Time of departure.	Time spent.	Speed. Km./h.	Speed. Miles/h.	—
a) **Steam or electric trains.**							
Copenhagen-Masnedö	130	80.8	R 4.05 a. m.	1.56	67.2	41.8	Berlin.
Do. -Masnedsund	120	74.6	R 4.30 p. m.	1.44	69.2	43.0	Do.
Do. -Korsör	111	69 0	1.30 a. m.	1.15	43.7	27.2	Aarhus.
b) **Railcars.**							
Copenhagen-Fredericia	243	151 0	11.45 a. m.	3.28	70.1	43.6	Vestjyden.
(Copenhagen) Korsör-Aarhus	242	150.4	9.16 a. m.	3.21	72.2	44 9	Kronjyden.
Copenhagen-Korsör (Aalborg)	111	69.0	8.00 a. m.	1.09	96.5	60 0	Do.
Do. (Padborg)	Do.	Do.	10.16 p. m.	1.32	72.4	45.0	MI 87.
c) **Ferry boats.**							
Gjedser-Warnemünde	44.5	27.7	...	1.55	23.5	14.6	Baltic.
Copenhagen-Malmö	29.7	18.5	...	1.30	20.0	12.4	Sund.
Korsör-Nyborg	26.0	16.2	...	1.10	22.3	13.9	Store Belt.
Faaborg-Mommark	24.0	14.9	...	1.20	18.0	11.2	Company.

XLVII-6. — **Conclusions.** — As has been shown, Denmark has made a great effort to accelerate its train services in recent years. In order to shew how the traffic is divided as between steam and electric traction and railcars, we have shown separately the track mileage run over by each of these kinds of traction methods at different maximum overall speeds, as well as the total mileage, subtracting the mileage used twice over.

The percentage for the whole system is about half the above percentage, except in the case of lines run over at less than 60 km. (37.5 miles) an hour, which is 76 %, say 3/4 of the system.

TABLE 281.

MILEAGES AND PERCENTAGES OF DANISH STATE RAILWAYS RUN OVER AT VARIOUS SPEEDS.

(Miles are shown between brackets and percentages *in italics*.)

HOURLY SPEEDS.	Over 100 km. or 62 miles.	95 to 99 km. (59 to 61.9 miles).	90 to 94.9 km. (56 to 54.9 miles).	80 to 89.9 km. (50 to 55.9 miles).	70 to 79.9 km. (44 to 49.9 miles).	60 to 69.9 km. (38 to 43.9 miles).	Under 60 km. (38 miles).
Trains	...	...	...	20 (12.4) *0.79*	429 (266.6) *17.1*	684 (425 0) *20.9*	...
Railcars	61 (37 9) *2.5*	77 (47.8) *3.1*	181 (112.4) *7.2*	32 (19.9) *1.2*	210 (130.5) *8.4*	125 (77.7) *5*	...
Ferries	...	...	...	...	...	...	168 (104.4) *6.7*
Total (1)	61 (37.9) *2.5*	77 (47 8) *3.1*	181 (112.5) *7.2*	32 (19.9) *1.2*	372 (231.2) *14.8*	422 (262.2) *16.8*	1 363 (847 0 *54.4*)

(1) Taking into account mileages used twice over.

(To be continued.)

[625. 17 (.42)]

Railway maintenance problems.

Permanent way (*),

by Lt.-Col. H. A. HULL, M. Inst. C. E.,
District Engineer, Northampton, L. N. W. R. & L. M. S. R., 1918-1933.

(*The Railway Gazette.*)

Notwithstanding all the knowledge now available in print, some of the most essential and elementary facts are often ignored. There are always pioneers at work, on whose heels follow those with ingenious minds to record their results as formulæ for the future guidance of the unimaginative or timid.

Considering the vital importance of permanent way to a railway it is surprising how little attention this factor claims from the public. Indeed, even by other departments of the railway itself, difficulties are sometimes raised in connection with the granting of facilities required for maintenance purposes through nothing more than lack of understanding on their part. Although the metals would be of no commercial use without the traffic to run upon them, yet it might be borne in mind that their absolute continuity is a vital necessity and the hiatus of even a foot would dislocate the most elaborate traffic working. The moral of this is that each department of a railway should try to appreciate the importance of the work of the others.

It is of paramount importance that the materials composing the permanent way, besides being sound and reliable for the immediate purpose, should also be capable of lasting for as many years as possible in their original situation. A regular top is essential for smooth running, although it does not necessarily follow that slight irregularities are a source of danger. The alignment must be laid and always maintained true, and finally the ballast must be kept clean and the drainage efficient.

The best means of assuring the foregoing is suitable man power, both as regards quality and strength, and over all there must be close and constant supervision. Besides travelling over the line as frequently as possible, the author found it good practice, in order to obtain uniformity in the various duties concerned with the maintenance of the road, to hold a monthly meeting of his Chief and District Permanent Way Inspectors. At these meetings all questions affecting the permanent way were discussed and minutes were kept.

The road must have constant attention by skilled men. A good ganger or platelayer is not made in a day, and the modern tendency to reduce the length gangs to a bare minimum and take on temporary untrained labour for special work, or to reinforce the attenuated length gangs when their work has become too much for them, sooner or later reacts upon the well-being of the permanent way. When the necessity for economy arises the permanent way should not be the first upon which the blow falls, or the cost in the long run may be excessive.

That an even top is not regarded by all engineers as of equally great importance was brought home to the author when, at the time of the amalgamations, he took over the maintenance of cer-

(*) This is the 6th of a series of 9 articles by the same Author, published in *The Railway Gazette.*

tain lines outside his original district on which he found many sections with dipped joints. These sections had been maintained with an ample number of men per mile by beater packing. The men in charge assumed that nothing could be done to cure the dipped joints, regarding them as a matter of course. The author, however, having been brought up on the practice of shovel packing, decided to institute this method of maintenance on his new sections. The District Inspectors and then the gangers were duly instructed in the method and, at an appointed date, all the beaters were withdrawn and shovel packing instituted. The results were most satisfactory and within a year there was a distinct improvement in the top and the dip at the joints had disappeared. Once used to the new method the gangers, without any exception, declared that they would not like to revert to beater packing, for, besides being able to maintain a better top, they could do so with less strain.

The cause of the dipped joints was doubtless attributable to the close proximity of the joint sleepers preventing their being packed with the beater from both sides. The packing being driven always from one side, the sleeper became slightly tilted, as indicated in figure 1. With shovel packing it was posible to overcome this. There is no doubt, also, that where much fettling is required and beater packing is used, the underside of the sleeper in the course of time becomes rounded, as shown in figure 2. This prevents the sleeper standing firmly upon its bed and contributes to irregularities of the top.

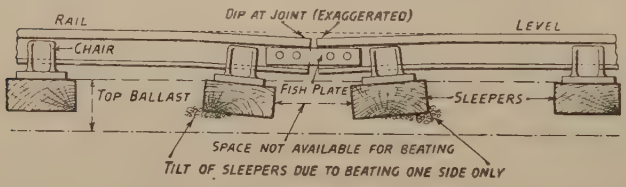


Fig. 1. — Sectional elevation of road, showing dip joints.

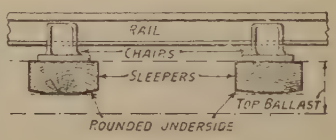


Fig. 2. — Section of sleepers, showing rounding of underside due to beater packing.

The lines incorporated in the author's district, being deficient in ballast, had to be lifted two or three inches on fresh ballast, and the opportunity was taken to use ballast of a size more suitable for shovel packing than the original material, which was rather large. The advocates of large top ballast sometimes maintain that better drainage is obtainable than if the ballast is small. While there may be some truth in this when the ballast is new and clean, yet the causes of inefficient drainage are common to both large and small ballast. The ballast must be cleaned from time to time, and the small ballast is much easier to deal with when doing so. The author found that with the ordinary strength of a length gang it was possible to riddle the ballast once in ten years, which was sufficiently often for all pratical purposes. Riddling by two men, one shovelling and the other shaking a circular shallow hand riddle, proved the most expeditious and economical method of many that were tried. Neglect to keep the ballast clean inevitably told its tale on the condition of the road.

The temptation with the novice in shovel packing is to pack excessively, and this tends to emphasive any hollowness in the adjoining sleepers and even to cause hollowness where there was none before. Close observation on the ground shows that on a average only two or three of the sleepers in each rail

length are tight down on their bed, the intervening ones hanging slightly and taking their bearing only under the load of passing trains. Knowing this the experienced ganger will, when a new road has been laid or an old one renewed, concentrate on certain sleepers equally spaced in each rail length, and will afterwards aim at bringing the intermediate sleepers up to the proper height.

Although the smoothest running can be obtained only when the track has a regular top and true alignment, yet modern bogie rolling stock, when well maintained, will run fairly smoothly even over an irregular track. The most potent cause of rough running is irregularity of cant on curves.

Relaying.

The chief causes in the depreciation of the materials comprising the permanent way are plainly indicated in the periodical relaying reports of the District Engineer. The relative importance of the causes that contribute to the necessity for relaying are found to be as follows :

(1) Sleepers split, chair-galled and beginning to decay, and fastenings becoming loose and worn.

(2) Sleepers chair-galled and fastenings becoming loose and worn.

(3) Rails knocked down at the running-on end.

(4) Rails side cut.

(5) Rails getting light.

(6) Rails roaring.

(1) This is an indication that the road is approching the limit of its life and should be relayed completely in the near future. The life of the wooden sleeper does not necessarily synchronise with that of the rail, but the advent of a suitable steel sleeper may make this possible. The sleepers generally used in this country are of creosoted Baltic fir, and in the author's district there were instances on branch lines where sleepers remained in their original position for 40 years, and when taken out were found even then to be still sound enough to be used for other purposes. These sleepers were obviously of slow-grown timber, well seasoned, and the fact that they were still black when taken out of the running road indicated that they had been well creosoted.

The average life of a well seasoned and creosoted sleeper, with its fastenings, in a main line may, however, be taken as 20 years. After that time the sleepers may be found fit to be used again for repairs to running lines or for sidings, or, if not in good enough condition, they may be sawn up for fencing or firewood. Approximately 15 per cent. can be used again in the running lines, 35 per cent. in sidings, 40 per cent. for fencing and 10 per cent. for firewood.

The best type of fastening in the author's experience is the galvanised coach screw, there being less spreading of the gauge with this than with the wooden trenails or iron spikes formerly used.

The author had a trial length of a quarter of a mile of dish-cover type steel sleepers which were laid on the ballast in exactly the same way as ordinary wooden sleepers when a certain length of road was being renewed. They were maintained by shovel packing, also in exactly the same way as wooden sleepers. After several years in the road, it is still not possible to detect their presence from any audible indication when travelling over them at speed. The top and alignment of the track is as good with these steel sleepers as with the adjoining lengths of wooden sleepers. The writer's experience of steel sleepers put down for trial in 1887 on a brauch line in open country with gravel ballast indicates that the steel sleeper has, owing to corrosion, a shorter life than the wooden sleeper, but this may have been due to the particular type of sleeper.

(2) The extent of indentation of the sleepers by the chairs, or chair-galling, depends largely upon the size and shape of the base of the chair. At Newbold water troughs, just north of Rugby on the Trent Valley line, the author's predecessor had used large joint chairs on all sleepers at the running-off end of the troughs where, of course, there was much water splash. Although these sleepers had to be renewed on account of their becoming thin due to the friction of the ballast on their undersides, aggravated by the action of water, yet there was no evidence at all of any chair-galling on the top (felt pads had not been used). The chairs in question were 10 in. broad and exactly covered the width of the sleeper.

(3) Close observation of the road during the passage of a slow train shows that there is a minute yielding under the load, a few of the sleepers remaining rigid whilst the intervening ones give slightly. Besides this there is a definite deflection of the rail itself between each chair, so that the wheels of the vehicles travel over a miniature switchback, to which nothing comparable is found on an ordinary macadam road surface. If the sleepers are evenly spaced throughout, this deflection by the reaction at the chairs forms a regular wave; but if the spacing of the sleepers is appreciably different at the joints there is a corresponding alteration of the wave length, the altered pitch causing the wheels to leap (in a way comparable to a diver running up a spring board), with the result that the wheels alight with a bounding action several inches beyond the running-on end of the rail. Thus, instead of the butt end of that rail becoming the most worn, the largest wear occurs some distance ahead and will eventually cripple the rail. This matter deserves careful attention, since the pounding of the rails, as described above, directly necessitates much of the relaying.

It is doubtful whether the present tendency towards shorter joint bearings and fishplates will eventually prove so satisfactory as the use of longer, well fitted fishplates to ensure the continuity of the strength of the rail, and with the joint sleepers spaced uniformly with the intermediate sleepers so as to avoid the jump described above.

(4) Side cutting has been put in the fourth category by the author as the result of experience on his original district, where the curves were for the most part flat and the road maintained by shovel packing. On the sections taken over at the time of the amalgamations, it was found, however, that although the rails were of an abnormally heavy section, side cutting was prevalent on flat curves, and even, in places, on the straight. A considerable amount of relaying had to be undertaken for this reason alone, despite the fact that otherwise the track might have lasted for many more years.

Faulty maintenance, resulting in uneven bearing and consequent variations in level, both on the straight and on curves, under the passage of trains, was probably responsible for this side cutting. It was certainly not due to insufficient cant on curves, as the following instance will show. Figure 3 is the diagram of a junction showing what part of the curved track is superelevated, and what part cannot be superelevated owing to the junction itself. It was found that side cutting was just as great on the superelevated line beyond the junction as it was through the junction itself, despite the fact that the speed restriction and the radius of the curve were uniform throughout.

(5) Apart from side cutting, the cause of rails getting light is the direct wear of traffic, and the frequency and weight thereof, as well as deterioration due to atmospheric conditions. A certain amount of rail changing may be required where excessive wear occurs locally

due to the slipping of driving wheels. On branch lines, where the traffic is light, the rails may stand resleepering, but on main lines carrying heavy traffic it is usual to relay entirely with new materials, and to re-use the rails, if they are serviceable, on branch lines or in sidings. Rails to be so re-used should be numbered in sequence at their ends when they are taken out, so that when they are relayed elsewhere they will track properly and enable a good top to be obtained.

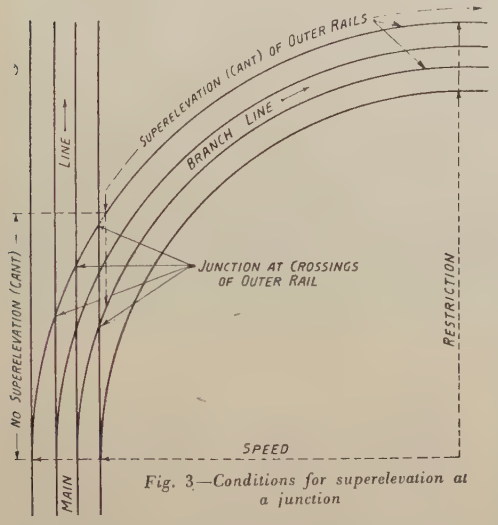


Fig. 3.—Conditions for superelevation at a junction

(6) So far as the author is aware there is no satisfactory explanation of roaring rails, but it is occasionnally responsible for the necessity to relay.

The information required in compiling the relaying report emanates first from the ganger and is revised by his District Inspector, who then passes it through the Chief Permanent Way Inspector to the District Engineer, who finally makes a detailed inspection on the ground. This takes place usually about two years before the actual relaying operation is due, the lapse of time being taken into due consideration, of course.

The author's considerable experience of permanent way maintenance has convinced him that the simpler the work is kept, and the less cumbersome the machines employed, the more economically and safely can the work be performed. Well trained gangs of men are the most potent factor in achieving economy.

[**621**. 335 (.73) & **621**. 43 (.73)]

Santa Fe's new 3 600-H.P. diesel-electric locomotive makes record run.

(Railway Age.)

Leaving Los Angeles, at 5 00 a.m., October 16, on an unannounced test run, the 3 600-H.P. diesel-electric locomotive, recently delivered to the Atchison, Topeka & Santa Fe by the Electro-Motive Corporation, made a record run to Chicago, hauling a nine-car train of conventional heavy steel passenger cars. The arrival time at Chicago was 10.34 p. m. October 17, evening, the train thus completing a run of 2 228 miles in a total elapsed time of 39 h. 34 m., including 11 scheduled stops. This constitutes a record long-distance run for any train of standard steel equipment. Over 15 hours was cut from the time of the Santa Fe's « Chief », the fastest regular flyer between Los Angeles and Chicago; while 5 h. 20 m. was cut from the record of 44 h. 54 m. made between the same points by Death Valley Scotty's famous special train in 1905, a record which

has stood unchallenged for nearly 30 years.

The performance of the diesel-electric locomotive is notable because of the heavy train handled, over 720 tons, and the fact that no extraordinary preparations were made in advance. The train was returning to Chicago on the second of two routine test runs, during which the performance of the locomotive in high-speed heavy passenger train service was being studied. While greatly pleased with the results of the test run and particulary the comfortable riding equipment even at maximum speeds of about 100 m. p. h., Santa Fe officers say that it is not contemplated to operate regular passenger service between Chicago and Los Angeles on the basis of the record time made. The schedule of the Santa Fe's proposed new train, « The Super-Chief », which the powerful locomotive is designed to draw will, however, undoubtedly be several hours faster than existing schedules between these points.

Description of the locomotive.

The new diesel-electric locomotive was designed by engineers of the Electro-Motive Corporation, General Motors subsidiary, in conjunction with the Santa Fe, and built at the St. Louis plant of the St. Louis Car Company. It is the largest and most powerful locomotive yet arranged to be driven by internal combustion engines, although a similar Electro-Motive Corporation double-unit locomotive of the same power is now being tested on a number of roads and a single-unit locomotive, of the same design and developing one-half the power, was placed in test service on the Baltimore & Ohio several months ago.

The Santa Fe diesel-electric locomotive is a multiple-unit of two identical sections. The complete locomotive is 127 ft. 8 in. long between coupler-pulling faces, weighs 250 tons and has a tractive force of 120 000 lb. at starting and 19 000 lb. at a speed of 60 m. p. h. The width overall is 9 ft. 9 5/8 in., height overall 14 ft. 3 in., truck wheelbase 8 ft. 6 in., truck centers 40 ft. and wheel diameter 36 inches.

The two locomotive units are streamlined, for appearance, with sloping ends, and all apparatus is concealed. A skirt extends around the locomotive, blending the pilots in graceful contours. The headlights also are streamlined, being built into curved receivers in the roof of each unit. The superstructure is built of steel shapes and Cor-Ten rolled plates riveted and welded together.

The locomotive is arranged for double-end operation with an operator's cab at each end of each unit. The engine-room compartment is separated from these cabs by steel partitions fitted with swinging doors. These doors are located back of the cab side entrances to afford easy entrance and exit from each operator's compartment. All windows in the operator's cabs are glazed with safety glass. Front windows are equipped with windshield wipers and cab side windows have sliding and drop sashes. The control station of each cab is so located as to afford the operator a clear view of both sides of the track, which promotes greater safety and ease of operation.

The engine compartment is especially designed for ease in the inspection and maintenance of equipment. Ample room has been provided around all pieces of apparatus. Aisleways extend from cab to cab along both sides of the locomotive and are free from obstruction. Large drop sash windows furnish plenty of light. The roof above the engine compartment is made up of removable sections to facilitate removal of the larger pieces of apparatus when necessary.

The underframe is a Commonwealth one-piece steel casting, with end sills cast integral and so designed as to withstand all stresses to which it will be

Fig. 1. — The 3 600-h.p. diesel-electric locomotive recently delivered to the Santa Fe by the Electro-Motive Company.

subjected in ordinary service. There are suitable openings throughout for piping, wiring, and conduit. At all points where stresses occur, extra ribbing has been provided.

Two four-wheel swivel trucks, with 36-inch wheels and 6 1/2-inch by 12-inch plain journals, support the underframe on 18 1/2-inch center plates spaced 40 feet apart. The rigid wheelbase of each truck is 8 ft 6 in. The truck frames are of the swing bolster type with Commonwealth cast steel frames.

The locomotive is equipped with the Westinghouse 8-EL straight and automatic air brake schedule, modified to permit the installation of a continuous railway control system. Clasp brakes, fitted to all wheels, are operated by four brake cylinders per truck. Sand boxes are located in the engine room for sanding the front wheels of the leading truck.

The steam generator provided in each unit for heating and air-conditioning the trailing cars was produced especially for this locomotive by the Vapor Car Heating Co. It is a light-weight, compact, automatic unit and draws its fuel from the same storage tanks that supply the power plant. It has an evaporation capacity of 2 000 lb. of water per hour and a working pressure of 200 lb.

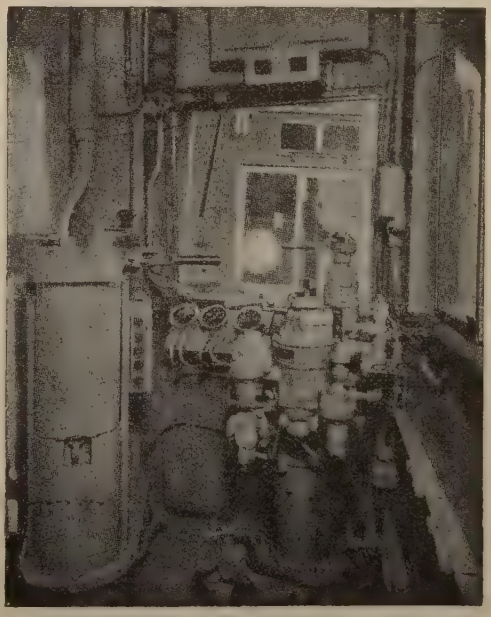


Fig. 2. — Arrangement of control equipment at one of the operator's stations.

The locomotive boiler water capacity is 1 250 gall., provided in four rectangular tanks hung symmetrically about

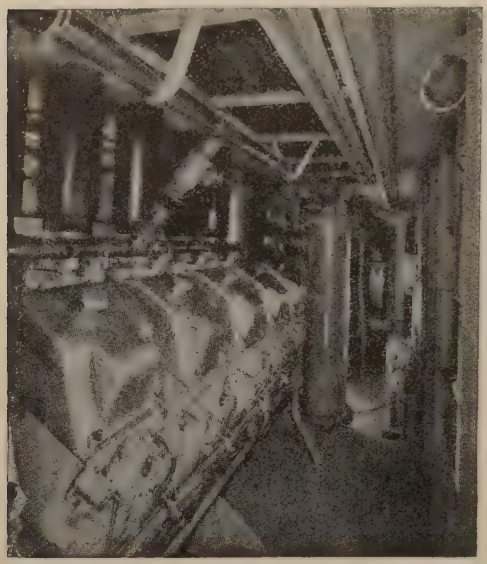


Fig. 3. — One of the Winton 900-H.P. diesel power units in the engine room.

the center lines outside the center sills. These tanks are heavily insulated to prevent the water from freezing in cold weather. They have a common water-filling manifold fitted into the car roof in the center of the locomotive. By lifting the hatch cover to this manifold, the water tanks may be filled from a regular water crane.

Principal features of the power plant.

Motive power for each unit is supplied by two 900-H.P. oil-electric power plants mounted on the underframe directly over each center plate. The combined rating of these two power plants is 1 800 H.P., a total of 3 600 H.P. for the two units, and all of this power, except for necessary losses in transmission, is available for traction purposes. The power required by auxiliaries is either supplied by auxiliary engines or taken from the main engines in excess of their rating.

The main engines comprise two Winton V-type, 12-cylinder, high-compression, two-cycle oil engines of 8-inch bore and 10-inch stroke. Each of the engines is conservatively rated at 900 H.P. at 750 r.p.m. These engines are extremely light in weight, weighing less than 20 lb. per H.P., this notable saving in weight over the usual type of diesel engine being effected by incorporating several improved features of construction. The uniflow principle of scavenging, which is utilized, permits the use of a two-cycle stroke at greater efficiency than is generally obtained in engines of this type. The welded steel crankcase construction, which is stronger than the usual cast-iron frame, provides a great saving in weight.

Another feature of note is the patented unit-injection valves which assure complete atomization of fuel in the cylinders. All working parts of the engine are readily accessible without dismantl-

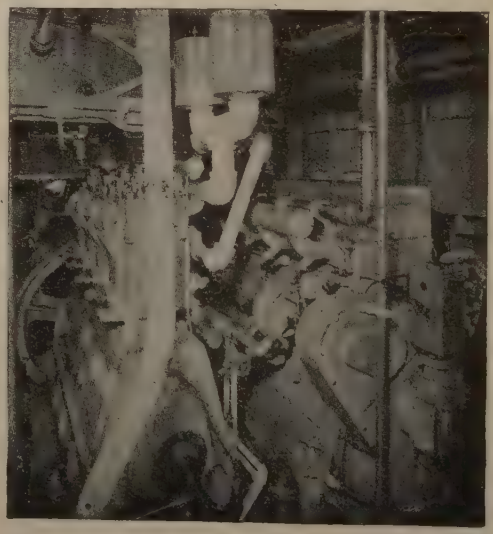


Fig. 4. — Auxiliary power equipment located in one of the locomotive engine rooms.

ing the complete engine. Convenient hand-hole covers permit access to the connecting rods and main bearings. Cylinders have individual heads and removable liners. All working parts are designed to require a minimum of maintenance, and also to permit such maintenance being done in the average railroad shop with its present type of equipment and personnel.

Each engine cooling system consists of a series of fin-tube radiators, water circulating pump, and air circulating fans for radiator cooling. The cooling radiators are arranged in two long sections of coupled units hung parallel to the power plant, and supported by the underside of the engine-compartment roof. Each engine receives its water from a common water supply tank, located in the center of the car below the level of the radiators to permit self-draining of the radiators during cold weather. Provision has been made to keep this water warm when the locomotive is not in service by admitting steam from the heating system into the engine water jackets.

Air is drawn into the engine compartment through grilled openings at each end of the locomotive, and forced by means of large engine-driven fans through the radiators. After passing through the radiators, the air leaves the locomotive through a series of vents, into the exhaust-manifold well in the roof.

Lubricating oil system. Fuel system.

The lubricating oil system of each engine consists of a supply tank, a water cooler, circulating pumps, strainers, and filters. Two sumps, one at each end of the engine crankcase are fitted whith removable strainers. A dual scavenging pump draws the hot oil from these sumps and passes it through a large-capacity water jacketed oil cooler to the oil supply reservoir. Here it is filtered, and then taken back to the engine by means of a pressure pump. The pressure is regulated by a relief valve. Provision is made on the engine to close the engine throttle in the event of deficient oil supply.

Fuel for the engines is carried in two 400-gallon storage tanks located under each unit, a total of 1 600 gallons for the two units. These tanks are equipped with efficient strainers and filling manifolds to provide quick refueling without elaborate equipment, and can be filled from either side of the locomotive. Fuel is delivered to the engines by means of motor-driven fuel pumps. A 25-lb. pressure head, maintained on the fuel header, is regulated by a spring-loaded by-pass valve which empties into the fuel tanks.

An exhaust muffler is mounted in a well located in the roof over each engine. Individual stacks from each cylinder terminate in this muffler which vents to the outside through four stub riser pipes welded in the top. This muffler is designed to prevent the pocketing of fumes and also to reduce exhaust noise to a minimum.

In the center of each unit is a group of three auxiliaries all driven by a 6-cylinder, 900-h.p. Diesel engine. The auxiliaries are the air compressor, battery-charging generator, and traction-motor blower fan.

The Winton air compressor is a 4-cylinder, 2-stage, water-cooled unit, with a displacement of 158 cu. feet per minute. This supply of air is continuous regardless of car speed, as the auxiliary engine speed is constant. The compressor is equipped with governors which control an unloader on the compressor to maintain the required pressure in the air reservoirs.

A 10-kw. generator is supplied to charge the storage battery. This generator, with its control, provides a constant potential battery charging sufficient for all conditions under which this equipment is used.

The third unit of this auxiliary group is a centrifugal blower fan which supplies air to the traction motors via the air ducts provided in the inderframe.

The electrical transmission and control system.

An independent electrical transmission, furnished by the General Electric Company, is provided to deliver power from each engine to the two driving axles immediately below that engine. Each transmission equipment consists essentially of a generator, two traction motors, and control contactors for connecting the motors to the generator in the proper sequence, and for reversing the direction of motion. There are no mechanical or electrical connections between the two power plants other than an electric throttle and controller which controls both from either end of the locomotive.

Each engine is directly connected through a flexible coupling to a direct-current generator, especially designed to provide characteristics most suitable for this particular engine. Each has sufficient capacity to transmit continuously to the traction motors the rated output of the engine for which this equipment is offered. The exciter for each generator is mounted on the extension of the generator shaft and is used solely for excitation purposes.

Four traction motors of the General Electric railway series type are provided, two mounted on each truck. Each traction motor is geared to a pair of driving wheels and supported by a spring nose suspension to protect it against undue strain.

The multiple-unit control system used on this locomotive has been so designed that any number of units may be coupled together and be controlled from one operator's station. This provides a great range of flexibility for this type of locomotive, as units can be added when traffic conditions require additional power.

The entire control system centers around a trunk line extending from one end of the locomotive to the other and terminating at each end in a plug socket from which a jumper may be used to carry the trunk lines to the next locomotive if more than one locomotive is to be used. The various lines in this trunk feed contactors which control the different pieces of apparatus in the locomotive. This trunk line operates on battery voltage. As the high-voltage contactors are directly over the generator, this provides a minimum of high-current-carrying wire.

A control station, provided in each cab, is equipped with a master controller, reverse lever, throttle lever, brake valves, sander valve, control switches, and instrument panel, so grouped around the operator's seat as to give the greatest ease of operation.

The controller lever has three running positions for controlling the motor grouping to provide the maximum tractive force at all speeds. The controller is also equipped with a reverse lever to regulate the direction of travel. The throttle is equipped with eight running positions in addition to an idle position. Through electro-pneumatic linkage, it operates a Woodward variable-speed engine governor which in turn controls the engine speed.

The No. 8-El brake and sander valves are similar to those used on steam locomotives. Switches for the positive battery control of engine starting, fuel pumps, and exciter field are located on the side of the throttle stand. The various light switches are in a box over the operator's side window. This gives the operator complete control of the locomotive at his station.

Each unit is completely equipped with instruments to check the operation of the various pieces of apparatus. At each control station is an instrument

panel upon which are located the two air gages, speedometer, and warning lights for low oil supply. On each of the main engines is an instrument panel containing a tachometer, water thermometer, and fuel and lubricating-oil pressure gages. The auxiliary engine has a water thermometer, fuel and lubricating-oil pressure gages. Each engine also has connections for an exhaust pyrometer for measuring the temperature of the exhaust gases of each cylinder. The heating boiler has steam pressure and water level gages.

Double-end continuous train-control apparatus, furnished by the Union Switch & Signal Co., has the usual cab signals and is arranged not only to stop the train by means of brake application but to cut off the power from the engine in the event of a penalty stop.

The battery is an Exide 450-ampere-hour unit, consisting of 32 cells. This battery supplies electric current for engine starting, control operation, and all auxiliaries, such as fuel pump, boiler motors and locomotive lights.

The locomotive is well equipped with warning signals. A standard 14-inch bell with automatic ringer is mounted on the roof. At each end of the locomotive is a Typhon air horn. These horns give loud penetrating blasts and are used in place of the steam whistle. An electric siren is provided to give still further warning in cases of emergency. The locomotive is equipped with standard air signal equipment.

[385. (072 (.42)]

The new research laboratory at Derby, London Midland and Scottish Railway.

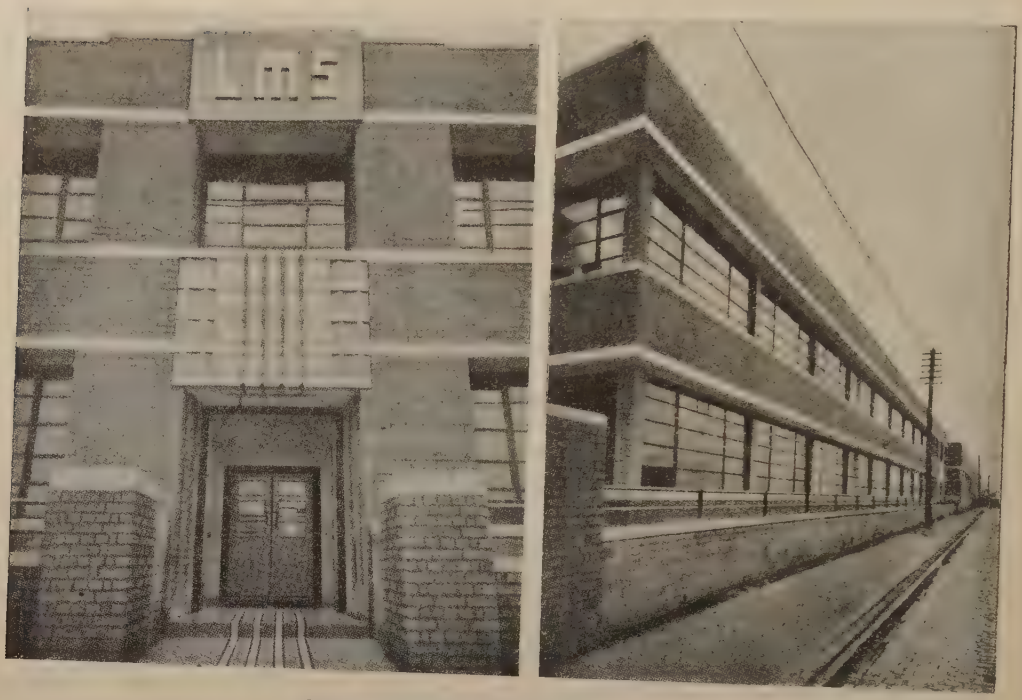
(*The Railway Gazette.*)

The various sections of the London Midland and Scottish Railway Research Department have now been brought under one roof. Each possesses well defined spheres of activity, particularly in regard to what may be termed routine work, but in many research investigations co-operation is essential, and this will be greatly facilitated by their being housed together.

The metallurgical section, under Dr. Hugh O'Neill, is concerned with investigations relating to the selection and manipulation, by casting, forging, heat treatment, welding, etc., of metals used throughout the railway, and for the metallurgical examination of materials that have failed to give satisfactory performance in service.

The engineering section, under the direction of Mr. F. C. Johansen, deals with research on the design and performance of engineering details of machines and structures, and with the mechanical properties of materials in relation to service requirements. It is also responsible for the investigation into the mechanical aspects of failures of materials in service and for the study of aerodynamical problems connected with the air resistance of trains, wind pressures, ventilation systems, etc. The work is carried out partly in the laboratory and partly, with the co-operation of other departments, in the field.

The textile section, under Mr. W. Pritchard, is responsible for the inspection and testing of the various textile materials purchased by the company, and for drawing up specifications controlling their quality. This routine work is on a considerable scale, some 8 000 complete tests being carried out each year. In addition, investigations into performance are carried out in the laboratory and in the field, and research

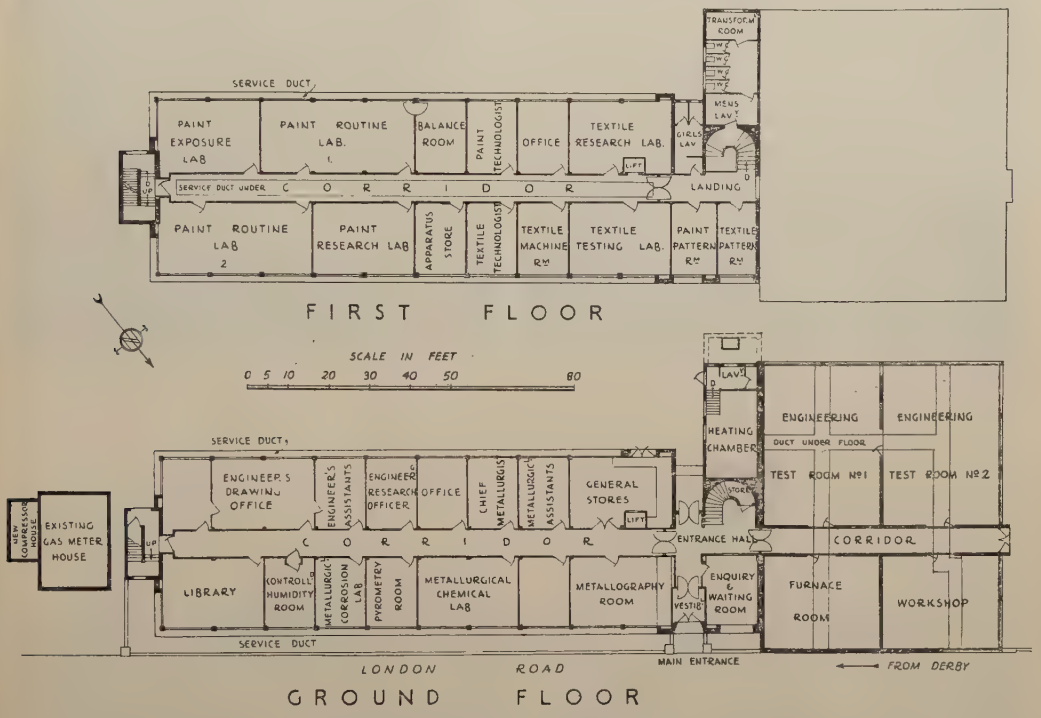


Main entrance and view from street.

The metallurgical and chemical laboratory.

on new materials and processes are required from time to time.

The paint section is under the supervision of Mr. F. Fancutt. Like the textile section, it is responsible for the specification and testing of paint materials, some 4 000 samples being dealt with each year. It is also concerned with the routine control of the manufacture of paint and varnish cleaning agents. It co-operates with other departments on questions relating to the choice of materials and methods of application, and it conducts research on improved materials, new methods of testing and better methods of application. For the purpose of easy control, the work is carried out by three sub-sections, one



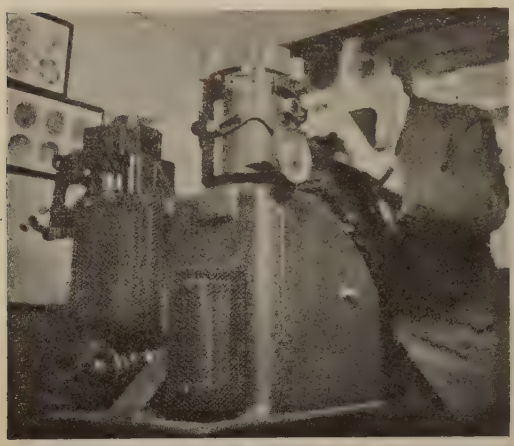
Plans showing arrangements of the new L.M.S. research laboratory.

concerned with routine work, another with application and exposure records, and a third with research.

Problems for research arise in a variety or ways : from the deliberations of the advisory committee, through the chief technical officers and at the suggestion of the Research Department. The more important and extensive investigations, wherever they arise, are discussed in the first instance by the advisory committe, which makes recommendations as to the general lines of attack, and on the question as to whether the work should be undertaken in the company's laboratories or in some outside institution. Less important investigations are put in hand on the authority of the Director of Research or Research Manager, and the results, if of sufficient interest, are reported to the committee on completion. Individual members of

the committee are frequently consulted on these minor problems.

Industrial research can prosper only if there is a two-way traffic in ideas. There must be complete confidence between the scientific staff in the laboratory and the manufacturing or operating staff outside. It was to encourage this co-operation that the new laboratory was located at Derby in close proximity to the locomotive and carriage and wagon works. In this way develop-



Metallography room, with Vickers projection microscope.

Wear-resisting machine in textile section.

ments in the laboratory can be readily tried out on the full scale in the works, whilst on the other hand difficulties arising in the works can quickly be brought to the laboratory for study and solution.

The new laboratory.

The new laboratory is adjacent to the carriage and wagon works of the Chief Mechanical Engineer's Department, and has a frontage on the south-west side of the main Derby and London Road, with rail siding access adjacent. The site is about 2 miles from the centre of the town and 3/4 mile from the L.M.S. station.

The building was designed by Mr. H. J. Connal, F. R. I. B. A., of the Chief Engineer's Department, and consists, south-east of the main entrance, of a two-storey laboratory block, structurally designed to permit the addition of another storey when required, with an engineering test room and workhop block, having a north light open roof, north-west of the main entrance.

The laboratory block has a total floor area on each floor of about 5 600 sq. ft. and the engineering test room and workshop block occupies an area of 3 500 sq. ft. The buildings are constructed on a steel frame principle, and the floors and roof flats to the laboratory block are of reinforced concrete. Every effort has been made to ensure that the premises are fire-resisting to the greatest possible extent. The main corridor walls to the laboratory block are in brickwork, and the cross partitions in movable metal-faced cork-insulated slabs. All internal partition walls in the engineering test room and workshop block are in brickwork. The internal doors throughout are also metal-faced and hung on pressed metal frames.

The ground and first floors of the laboratory block are planned on a unit system, each unit being 11 ft. 9 in. wide by 16 ft. in depth, and the various laboratories and other rooms therefore comprise one or more units as necessary. By this system of planning it has been possible to arrange for all units to have window area to their full width, thereby ensuring the fullest possible amount of natural lighting and ventilation.

The artificial lighting has also been carried on the unitary principle, a central fitting providing diffuse general lighting of an average level of 7 foot-candles, whilst additional illumination is provided on the benches, drawing tables, machines, etc., by adjustable fittings.

The main services, i. e., gas, compressed air, hot and cold water, heating and drainage are accommodated in a duct running the full length of the laboratory block on both sides, arranged for easy access to the pipes. The services to the engineering test room and workshop block are, generally, accommodated in underground trenches, all of which are readily accesssible.

The heating throughout is on the low pressure accelerated hot water system through ceiling panels, and the domestic hot water supplies are from the same boilers in an underground heating chamber.

Special care has been taken to isolate the engineering test room and workshop block in the main building by the introduction of cavity walls and special cork insulation to avoid the transmission of vibration throughout the laboratories.

The floor coverings have received special consideration, that in the laboratory block being of specially prepared red coloured asphalt, and in the engineering test room and workshop block, pre-cast concrete slabs made of a size to permit easy movement.

The only decorative treatment in the building other than plain paintwork is confined to the main entrance and staircase where the floors are paved in terrazzo, the walls having a dado of the same material. Externally the architectural treatment is in multi-coloured bricks with reconstructed stone dressings.

The general contractors were Greenwoods (Mansfield) Ltd., Mansfield, and the furniture and laboratory fittings were supplied by F. Jackson & Co. Ltd., Manchester.

The general arrangement of the accommodation is shown on the plans reproduced, and some notes on the equipment are set out below.

In the metallography room, where metals are microscopically studied, the photomicrographs are taken on a large Vickers projection microscope. A Zeiss workshop microscope is provided for bench work, and there are dark rooms and the usual polishing and etching apparatus. X-ray and electron diffraction apparatus, as well as a spectograph, will be installed in Room 2 when required. In the chemical laboratory there is a thermostatically controlled Hearson electric oven. Besides the preliminary chemical investigation of materials, the macro-etching of ingots and forgings and the production of fluxes and experimental electrodes are carried out here.

The main equipment in the pyrometry room is a Tinsley thermo-electric potentiometer with galvanometer and Cambridge chronograph. A 3 1/2-kw. Silit high-temperature and various electric tube furnaces are available for heating specimens, whilst a Hyvac oil pump enables this to be done *in vacuo*. A Cambridge thread temperature recorder is also to be available, and provision has been made for connecting it by leads to apparatus in other rooms. In the constant temperature and humidity room, where strength tests on textiles are carried out under conditions of constant relative humidity, a Services type of humidity control appa-

ratus is installed. The tests are carried out on Goodbrand testing machines. Room No. 7 is the library, in which a librarian translator is available. The drawing office is in Room No. 9.

In the workshop block the equipment in Test Room No. 1 (engineering section) comprises standard machines requiring no detailed references. There are a Wöhler fatigue testing machine, a modified Haigh electro-magnetic fatigue testing machine, a 15-ton Buckton machine, an Izod pendulum, a Brinell machine, a Vickers diamond pyramid indenter, and a Firth hardometer; as well as a variety of small apparatus including certain instruments designed for specialised field work, such as an instrument for measuring rail wear, corrugation and dip at rail joints; an accelerometer for measuring maximum impact accelerations, and a statical deflectometer for recording spring deflections. In the second test room are the larger continuous running machines. They are, so far as possible, mounted on rubber and rest on the tiled floor without permanent foundations in order to reduce noise and vibration, as well as for possible future rearrangement.

Two machines, designed by the engineering section are of particular interest. In one of these, a wear testing machine, two annular specimens can be rotated under forced peripheral contact at varying speeds and degrees of surface slip. The other machine, for studying the nature of the wear of rails and tyres, simulates a pair of wheels which revolve in contact with a rotating track. An electric motor drives the wheels, and power is taken by a generator driven by the track. In addition to studying wear problems, the machine is used for measuring wheel slip, and frictional and derailing forces under known applied conditions.

Room No. 18 is a well equipped workshop for the preparation of test pieces and the manufacture of instruments, apparatus and testing machines. The furnace room contains a 35-kVA high frequency spark gap induction melting furnace complete with ingot moulds and a small gas furnace for heating the feeder heads. There is also a 2 1/2-kVA resistance furnace. Heat treatment is conducted in a 14-kVA furnace with automatic recording temperature control, whilst a 9-kVA furnace with automatic control up to 1 350° C. is provided for high temperature work. A circulating air tempering furnace, taking 4 kVA and thermostatically controlled from 100°-700° C. is also available, and weighing machines, quenching tanks, etc., complete the equipment. For sand testing there are a Simplon-August mill, a Speedy moisture tester, shakers, gas permeability and ramming apparatus and a compression strength testing apparatus.

On the first floor are the textile testing and research laboratories and textile machine room, containing, besides the necessary facilities for textile tests, a washing machine for studying laundering problems.

On this floor are the paint research, paint routine and paint exposure laboratories. In the last, accelerated tests are carried out in a weatherometer which produces in five weeks results comparable with those of 12 months outdoor exposure. Both the paint and textile sections are provided with pattern rooms.

A small atmospheric wind tunnel of the enclosed type, having a rectangular working section 4 ft. 6 in. wide by 3 ft. 6 in. high, has been designed and installed in the paint shop in the locomotive works. It is operated by a motor-driven two-bladed air-screw giving air speeds up to 100 ft. a second.

[621. 43 (.492)]

The Dutch diesel train failures.

Under the above heading we reproduced, in the June 1935 number of the Bulletin, *page 746, with the kind permission of* The Railway Gazette, *London, an article published in* Diesel Railway Traction, *supplement to the February 22nd, 1935, number of that Journal, in connection with the new Dutch diesel trains and some difficulties experienced soon after they were put into service on the Netherlands Railways.*

This article contained a statement by Mr. HUPKES, *Chief Mechanical Engineer, Netherlands Railways, relating to these difficulties, and also the views of the* MAYBACH *Works, who designed the engines, of* Messrs. BROWN-BOVERI, *who supplied the major part of the electrical equipment, and of the* WERKSPOOR N. V., *who built 20 of the Maybach engines under licence.*

Mr. Hupkes now sends us the following additional information which we are pleased to submit to our readers.

* * *

As stated in Mr. HUPKES' note and in the paragraph showing the opinion of the Maybach Works, it was thought at first that the difficulties encountered were mainly due to the following unfavourable conditions : engines overloaded at reduced speeds; fuel supply sometimes defective and irregular, and use of unsuitable lubricating oil.

As regards engine overloading, it may be said that the information given by the Maybach Works, i.e. that at 800 r.p.m. the generators were capable of dealing with 200 B.H.P., is not correct; in service the power developed at that engine speed did not exceed 120 B.H.P.

The fuel supply equipment was altered, and a small feed tank installed under the roof of the engine room, the fuel being still pumped into this tank by air pressure. After this alteration had been made, no more trouble was experienced.

As for the lubricating oil, this had been substituted for that formerly used, as recommended by Maybach, some difficulties encountered with the engines having been ascribed to the original oil. This alteration had been made with Maybach's approval. A third brand is now being used with quite satisfactory results.

It is true also that the pistons originally used have been replaced by others made of an alloy having a lower expansion coefficient. It should be noted, however, that during the first period after the original pistons were put into service, little trouble was met with them, a small oil-fired boiler having been fitted, which enabled the cooling water to be preheated to about 140° F. before starting the engines.

Shortly after the first failures occurred, it was found that the fact that the engines had to be taken out of service (always after running from 19 000 to 22 000 miles), was mainly due to the main roller bearings being damaged and also, to a smaller extent, the big-end roller bearings.

Extensive tests carried out subsequently on the test bench of the Maybach Works, at Friedrichshafen, have clearly shown that, as regards the trouble with the main roller bearings, the causes enumerated at the beginning of the article in question were of very little importance, the main cause being that the bearings were overloaded, the overload

arising from the combined effect of the inertia forces, vibrations and combustion pressures.

As a result of these tests, the Maybach Works have fitted the crankshaft with counterweights.

The first two engines fitted with balanced crankshafts were put into service in September 1935, and have now covered about 62 000 miles, no difficulties having arisen. Two more balanced engines have covered about 47 250 miles, and two others about 40 400 miles.

On the whole, 23 three-car articulated trains, each equipped with two engines with balanced crankshafts, are now in regular service, and cover on the aggregate about 146 000 car-miles monthly. So far, no engine trouble has been reported.

The average mileage now being covered daily by the trains lies between 310 and 370.

Light inspections and running repairs are carried out every seventh day; cylinders, pistons and rings are inspected after about 37 000 miles have been covered. A general overhaul is not expected to become necessary before at least 62 000 miles will have been run.

In service, the mean fuel consumption per engine is about 0.22 Br. gallon per mile (including heating oil), and lubricating oil about 0.68 Br. gallon per 100 miles.

Thanks to certain improvements effected as regards the fuel pumps and injection nozzles, the maximum combustion pressure and the rate of pressure rise, which formerly were fairly high, have now been decreased.

No alteration was made to the electrical power transmission, except that the lowest running position was done away with.

Up to now, the Stork-Ganz engines have not given any serious trouble. With these engines, it has proved difficult to keep tight the packing between the cylinder and cylinder head, and the flexible portion of the piping connecting the engine with the lubricating oil cooler broke fairly often.

NEW BOOKS AND PUBLICATIONS.

[656. 21]

MÜLLER (Dr.-Ing. Wilh.), Professor at the Higher Technical School, Berlin. — **Neuere Methoden für die Betriebsuntersuchungen der Bahnanlagen** (*Modern methods of analysing the working of railway equipment*). — A volume (12 1/2 × 9 1/4 inches) of 46 pages, with 37 figures and 7 tables. — 1935, Berlin, Julius Springer, Editor. (Price : 5.80 R.M.)

Till now, the author has devoted his life to evaluating in the simplest possible way the phenomena of movement involved in the use of our transport equipment. Investigations of this kind are especially complicated in connection with steam locomotives with which it is the more difficult to adapt the power to the requirements of the service to be worked that the complicated design of the locomotive and the continual change in resistance with the alteration in gradients prevents any mathematical calculation of the relation between the power and the resistance.

The reserve energy available in the case of electric traction and internal-combustion motive power has no equivalent in steam locomotives with a view to their economical utilisation.

In Germany, with Unrein, Strahl, Velte and Caesar, Müller, by his wise selection of fundamental equations and approximations, has shown how to follow graphically this relation between the available power and the power used, and the resistance. Subsequently, by suitable modifications and simplifications, he has extensed his method to all forms of transport.

The author deals with steam railways in the present work, using the power tables for the Reichsbahn locomotives and the latest resistance formulæ. By using properly selected scales he has obtained directly from the tractive effort and resistance the distance covered in unit time, to the scale of the station plan, and the running times in terms of the distances travelled. Using this data in conjunction with the most recent investigations into the work done and times taken in signal boxes, he is then able to examine every operation — including those in shunting yards — carried out on the German steam-operated lines. He breaks new ground in his calculations of the percentage increase to be allowed for braking, which he has based on brake cylinder pressure diagrams and the Metzkow curves. The result is that the old values are now used only in analysing shunting operations alone, for which purpose Müller still draws the curve of times and distances run to show the distance at any moment between two wagons being shunted. Besides, wind resistance is only taken into account when calculating the speed with which wagons run down the shunting humps.

In computing the masses, Müller generally increases them by 9 % to allow for the revolving masses, this figure being based on the Reichsbahn's calculated traction costs, instead of the 6 % usually taken. Soldan has questioned this increase in connection with braking calculations on the ground that the work done in compressing the draw springs and bearing springs represents, it is true, a loss of energy when starting, and so reduces the acceleration of the train by lengthening the distance travelled whilst accelerating the train, but that, on the other hand it increases the retardation and shortens the braking distance and time when stopping it. Consequently by raising this allowance to 9 %, the spring effect during braking is eliminated and the braking distances, as calculated, are

safer. Whether and where 9 % or 6 % is to be used when applying Müller's method will doubtless be immaterial as the other simplifications he has introduced into his formulæ affect the results much more without, however, upsetting them.

Müller has developed his theories briefly and neatly. His pamphlet is a clear and sound introduction into his field of research. It is also an imitation and guide for all railway men wishing to obtain quickly, outside their everyday work, an idea of operating methods and operations and of the details of the service outside their ordinary duties. It will be found most useful when considering a scheme for a large or medium sized station, the respective location of goods and passenger stations, or the braking distances with new types of brakes.

W. Rd.

[385. (09 (.59)]

Fifty years of Railways in Malaya — 1885-1935. — One volume (12 × 9 1/2 inches) of 136 pages, profusely illustrated. — 1935, Published by the Federated Malay States Railways.

The inception of the railway system in the Malay Peninsula dates from 1885, when the first line between Port Weld and Taiping was opened to service.

The mileage of the railway system is now 1067, with 1 321 miles of single track, all metre gauge.

The main line serves the western side of the peninsula and runs from the great port of Singapore in the south to Penang, with an extension which connects with the Siamese railways, 580 miles from Singapore. Another line known as the East Coast line, ends on the China Sea at Tumpat with a branch running to the Siamese frontier. The main line is also connected by short branches to the West Coast ports, such as Swettenham, worked by the railway.

The book was published by the railway on its fiftieth anniversary and gives an abridged history of the growth of the railway with a description of the changes in rolling stock and fixed plant which have taken place in the same period.

Heavy bridge work was necessary when building the lines and this is illustrated by a series of photographs. Other illustrations show the harbours, station buildings, old and modern locomotives, carriages and wagons.

The locomotive workshops are located near the capital, Kuala Lumpur. They are provided with electrically-operated mechanical coal and ash handling plants.

The trains are worked over the single lines on the electric tablet system. As regards signalling, the Malayan Railways have fitted up Singapore station on modern lines with daylight signals.

The trains over the main line are handled on the train control system. The accounts and statistics are mechanised.

A table gives the gross receipts for 1894 to 1934 and the net receipts from 1885 to 1934. The gross receipts are seen to have fallen by 61 % from 1929 to 1933.

The railway has taken various steps, such as alterations in the rates, to meet competition from other methods of transport. Amongst the legal restrictions removed is that forbidding the railway to make agreements with private firms or individuals.

As can be seen, the Malayan Railways are far from being out of date as regards equipment and methods.

E. M.

[385. (09 (.42)]

Great Western Progress, 1835-1935. — Reprinted from the Great Western Railway Centenary Number of *The Times*. — A volume (9 3/4 × 6 inches), of 180 pages with many illustrations and an inset map.

The Great Western is the railway of Brunel, the advocate of the broad gauge, and of Gooch, who was responsible for the Locomotive Department from the opening of the railway, for over thirty years. As a railway it has been famous for many years for records for long distances and for high speeds made by its crack trains.

The book consists of a series of short chapters, some dealing with the inception of the railway, some describing the changes and progress made during the century, and others giving particulars of modern methods in use, or showing the benefits the railway has brought to mankind.

The most appealing chapters are those about Brunel and Gooch, and the often heated discussions raised by the « Battle of the Gauges ». The seven-foot gauge finally disappeared in 1892, and was celebrated by a cartoon in *Punch*. The conversion was facilitated by building easily convertible rolling stock.

Amongst the many other illustrations adorning the book should be mentioned those of the early locomotives which were all single-drivers predestinating the railway to high speeds. There are also a number of landscapes and views of charactristic monuments in the country through which the railway runs, besides views of the « Cheltenham Flyer » and the « Cornish Riviera Express » at full speed.

In a introduction entitled : « Co-operation in transport » Sir Robert Horne, the Chairman of the Company, stresses the idea of unity, the basis of perfection. One of the chapters is devoted to the road-rail question. The book recalls that, from its beginning, the Great Western had co-operated with the road and had carried road vehicles on specially built flat trucks, post horses being on hire at Paddington to complete the journey if desired. In more recent times, long before the Companies were authorised by Parliament to operate on the roads, the Great Western ran, as feeders to the railway, a large fleet of motor vehicles in the counties served.

E. M.

[656. 231]

DIAZ (Alfonso Imedio), Assistant to Head of Commercial Department, Madrid-Saragossa-Alicante Railway Company. — **Las tarifas ferroviarias y su ordenamiento y unificación** (*Railway rates : Their harmonisation and standardisation*). — Publication No. 35 of the Asociación General de Transportes por Via Férrea. — A pamphlet (9 1/2 × 5 1/4 inches) of 84 pages. — 1936, Madrid, Calle del Prado, 26.

We have already called attention to the valuable work done by the Asociación General de Transportes por Via Ferrea (General Railway Transport Association), in particular when it published, under the patronage of its present director, Don Blas Vives, the book : *Tres Años de politica ferroviaria* (see *Bulletin*, January, 1936).

Señor Alfonso Imedio Diaz's work is number 35 in the collection of documents the Association has published in order to give the public a clear idea of the true position of the railways.

The author discusses the standardisation of railway rates, a question which cropped up mainly owing to road and waterway competition, which has forced the railways to adapt themselves to the new conditions by further complicating

their tariffs. Previously the rates, taken as a whole were rather homogeneous, and relatively simple; they satisfied industry, trade, and agriculture.

So that any reader ill informed on the matter can read the discussion with profit, Sr. Diaz has given a very complete account of the present railway rates structure.

In the third part is given in full a translation of M. Brion's note « French railway rates and their evolution since the War » (extracts of which appeared in the August 1934, *Bulletin*, p. 773). The object of the author in putting before his readers the investigations of a French specialist has been to put forward, as an argument, the similarity in the railway situations and to show that measures taken elsewhere are equally desirable in Spain, where the same difficulties are experienced to an even more marked degree.

The author ends by recalling the proposals of the French National Economic Council (which resulted, as is known, in various reforms) and asserts that, if transport were co-ordinated on similar lines in Spain, it would be possible to revert to a simpler rates system based on the general interest instead of on competitive needs, and the main lines would be in a sounder financial position.

E. M.

[621. 43]

Traction Nouvelle. — A review of technical and general information on up-to-date traction, published every other month under the patronage of the French main-line railways. — No. 1. January-February 1936 (10 1/2 × 8 1/2 inches), 36 pages profusely illustrated. — Paris, J. Baillère et fils, Editors, 19, rue Hautefeuille. (Yearly subscription : France, 40 fr., Belgium, 50 fr., other Countries, 60 fr. (French currency).

There has been a very great development in the use of railcars on the French main-line railways which during the last four years have ordered nearly 600 cars and propose to purchase a further 170 in 1936. The review « Traction nouvelle » is being published under the patronage of the main-line railways in order to report the evolution of the railcar question in France. The Management Comittee numbers amongst its members railway engineers who have specialised in the subject. An Information Comittee has been set up consisting of recognised specialists in engine, railcar, automobile, aircraft and shipping designs, so that there shall be every facility for a continual exchange of views. All interesting reports presented to this Comittee will be published subsequently in the Review.

The first number, January-February 1936, contains two reports of particular interest : one by M. NICOLET, Assistant Chief Mechanical Engineer of the French State Railways and President of the Railcar Comittee, on the French railcar builders, their present opinions and tendencies; the other by M. GHILAIN, Chief Engineer, Belgian National Railways Company, on the railcars in use on the Belgian National Railways Company, the operating methods and results, and the new vehicles on order.

This number also contains details of the method of measuring and calculating railcar characteristic constants due to Messrs. FERRAND and ROUSSELET, of the French State Railways; details of the trials of a Renault and a Bugatti railcar at an average speed of 140 km. (87 miles) an hour between Paris and Strasbourg; particulars of the Congo-Océan Railway diesel-electric locomotives and on the railways' programmes for new cars in 1936; railway notes, technical

data, and a review of the press dealing with railcar questions.

The make up, printing and illustration of this review are particularly good. In view of the rapid development of the railcar industry, the publication of a well informed review of this kind will be welcomed by the many engineers interested in the question. It will also assist the exchange of opinions between the builders and the railway engineers.

A. C.

[385. (09.3]

Dr. HOELTZEL (Max), Honorary Member of the Frederic List Society. — **Aus der Frühzeit der Eisenbahnen.** Mit einer Bibliographie. Ein Beitrag zur Jahrhundertfeier der deutschen Eisenbahnen. (*The railways in their early stages*, with a bibliography. A contribution to the German railway centenary celebrations). — A volume (9 × 6 inches) of 112 pages. — 1935, Berlin, Julius Springer, 23-24, Linkstrasse. (Price : 4 Rm.)

This book is a further contribution to the history of the inception of railways.

Not limiting his work to one country or this continent the author has endeavoured to discover and make available the best sources of information for studying the facts connected with the birth of railways and for analysing the circumstances which led to or hindered their growth.

For this purpose, he has carried out enquiries in many public and private libraries, with varying success.

In the front rank he places List's writings, the best known writer of the period in Europe, especially in Germany. Switzerland possesses a collection of national papers on railways. In France much the same work is to be found in Laurent de Villedeuil's book. England and Amerika, whilst not giving the investigator the same facilities, possess papers written by men who travelled widely in connection with the introduction of railways.

Dr. Hoeltzel's bibliography given first of all in chronological order and then under authors, begins about 1800 (some works date back much earlier), and extends to the middle of the 19th century. A list of periodicals, the earliest of which appeared about 1830, completes this great amount of information.

In an instructive note entitled : *Vom Werden der Eisenbahnen* (What was the beginning of railways ?) the author has endeavoured to describe the conditions under which the railways were born and to recall the principal stages in the design of the track and the successive inventions which were crowned by Stephenson's locomotive.

E. M.

[621. 13 (02 (.42)]

Locomotive Engineer's Pocket Book, 1935. — A volume (6 1/2 × 3 3/4 inches) of 400 pages, with many figures. — 1935, The Locomotive Publishing Co., Ltd., 3, Amen Corner, Paternoster Row, London E. C. 4. (Price : 3 sh. 6 d.)

The « Locomotive Publishing Company » has issued a new revised and enlarged edition of its excellent pocket book to which we have previously called our readers' attention. The locomotive engineer and builder will find, in its well arranged forty chapters, very full theoretical and pratical data with many tables and diagrams, formulæ, and other information on the construction and use of the steam locomotive.

The paragraphs on train resistance, boiler evaporation, power and tractive effort of the locomotive, weight dis-

tribution and balancing of reciprocating parts, are particularly interesting. Most of these chapters include fully worked-out examples. Interesting information on the design and construction of the different parts of the locomotive is also given. Amongst new matter in this edition may be mentioned « boosters » with the method of calculating their tractive effort and steam consumption. The various types of poppet valve gears are described and a section is devoted to the internal-combustion-engined locomotive.

The appendices give diagrams of the principal types of British locomotives, and their leading characteristics in tabulated form, loading gauges, track gauges, mileage of railways throughout the world; notes on roller bearings, electric welding, continuous brake system, etc... in short a mine of useful information classified methodically in a small space, which will ensure this small pocket book retaining its old favour with locomotive engineers.

A. C.

[621. 151.1 & 621. 151.2]

DIAMOND (E. L.), M. Ss. (Eng.), A. M. Inst. C. E., A. M. I. Mech. I. — **The horse-power of locomotives : Its calculation and measurement.** — A pamphlet (12 × 9 inches) of 24 pages, illustrated. — 1935, London, S. W. 1, *The Railway Gazette*, 33, Tothill Street. (Price : 2 sh. 6 d.)

The *Railway Gazette* has just issued in pamphlet form a series of articles published in the course of last year, forming a very complete study of the various methods suggested for the measurement of steam locomotive power and the possibility of estimating it from design particulars. The author's aim has been to analyse comparatively the various methods suggested, based either on calculations or on road tests, or on stationary plant tests, and to consider the results. Many engineers have dealt with this matter and work of much interest has been published in various countries. Mr. Diamond has summarised them methodically; he puts before the reader with great clearness the present position of the problem and the points still awaiting solution.

The author defines the object of his enquiry in a preliminary chapter and calls attention to earlier investigations which resulted in formulæ or indicator diagrams giving the horse-power of steam locomotives, such as Clark's formula for the mean effective pressure in terms of the cut-off, Frank's formula giving the ratio between the power and the heating surface as a function of the speed, Desdouits' method using the dynamic pendulum, Goss's formula for the power and internal resistance of the locomotive; Von Borries', Dalby's, Von Richter's and Strahl's investigations.

After a short paragraph giving particulars of earlier experimental investigations in Germany, America and England, the author reviews the first attempts to evolve test methods on really scientific lines, such as Doyen's method in Belgium, an extension of Desdouits'; Nadal's tests in France using indicator diagrams; Sanzin's tests in Austria, and the first trials in Russia by Borodine and Lomonossoff.

A chapter is then devoted to the American test methods and calculations; the more recent tests carried out at Altoona by the Pennsylvania Railroad, formulæ proposed by the Baldwin Works, Cole, and Kiesel, and more recently by Lipetz whose 1933 article was reproduced in the *Bulletin*.

The Continental test methods based on road tests are then dealt with and include the Russian method due to Lomonossoff, the Polish method of Czec-

zott, with auxiliary engine, and the German method of Nordmann using specially fitted-up brake locomotives.

Finally the author shows how divided opinion is on these different methods; he thinks preference lies with the stationary testing plants in the case of tests for ascertaining the value and efficiency of special equipment, but with scientific road tests, generally less costly than the former, for ascertaining the practical working characteristics of the locomotives. These tests nonetheless involve considerable expenditure and the author thinks further efforts will be made to establish formulæ giving the horse-power with sufficient accuracy for all operating conditions. A new method has in fact been suggested by Strahl. The problem should not be insoluble in view of the increasing standardisation of steam locomotive design and construction.

A. C.

MONTHLY BIBLIOGRAPHY OF RAILWAYS [1].

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General Secretary of the Permanent Commission of the International Railway Congress Association.

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016. 385. (02]

I. — BOOKS.

In French.

935 621 .135.2 & 625 .214
oîtes d'essieux S. K. F. pour chemins de fer.
aris, Compagnie d'applications mécaniques, 15, ave- de la Grande-Armée. 1 volume, 102 pages et 192 res.

935 621 .33(.45)
a traction électrique sur le réseau des Chemins de de l'Etat italien.
ome, Ministère des Communications. 1 brochure, 50 es et figures.

935 691
GNEL (G.).
ratique du calcul du béton armé.
and, Rombaut-Fecheyr, 1, place d'Armes. (Prix : fr. belges.)

935 62. (01 & 721 .9
MBERT.
alcul direct des sections de béton armé soumises à lexion composée.
aris et Liége, Librairie polytechnique, Ch. Béranger. olume, 28 pages, 2 tableaux et 14 planches. (Prix : fr. français.)

935 669
IUZ (E.) & STOTZ (R.).
a fonte malléable.
aris, Dunod. 1 volume, 486 pages et 316 figures. ix : 145 fr. français.)

In German.

935 62. (01 & 621 .392
auerfestigkeitsversuche mit Schweissverbindungen.
erlin, V-D-I-Verlag. 1 Band, 46 Seiten mit 19 Zah- afeln und 194 Abbildungen. (Preis : 8.50 R.M.

935 621 (02
BBEL (H.).
'aschenbuch für den Maschinenbau.
Berlin, Julius Springer. 1. Band, 818 Seiten; 2. Band, Seiten. (Preis : Zus. 22.50 R.M.)

1935 385 (02
Henschel-Lokomotiv-Taschenbuch.
Kassel, Henschel & Sohn. 1 Band, 284 Seiten, 73 Zahlentafeln und 227 Abbildungen. (Preis : 7 R.M.)

1935 621 .116
KOLBE (H.).
Wirtschaftlichkeit im Dampfkessel-Betriebe.
Halle (Saale), Wilhelm Knapp. 1 Band, 68 Seiten, 12 Tafeln und 17 Abbildungen. (Preis : 6.80 R.M.)

1935 62. (01
Mitteilungen der Materialprüfanstalt an der Technischen Hochschule Darmstadt.
Berlin, V-D-I-Verlag. 1 Band, 82 Seiten, 10 Zahlentafeln und 94 Abbildungen. (Preis : 7.50 R.M.)

1935 624
SCHAECHTERLE (K.).
Pfeiler und Widerlager von Brücken.
Berlin (W. 8), W. Ernst & Sohn. 1. Band, 208 Seiten und 347 Abbildungen. (Preis : 15.80 R.M.)

1935 621 .392
SCHIMPKE (P.) und HORN (H. A.).
Praktisches Handbuch der gesamten Schweisstechnik.
Berlin, Julius Springer. 2. Band : Elektrische Schweisstechnik. 274 Seiten, 27 Zahlentafeln und 375 Abbildungen. (Preis : 15 R.M.)

1935 621 .31
WERNER (P.).
Energieübertragung und Umwandlung mit Wechselstrom.
Leipzig und Berlin, B. G. Teubner. I Band, 204 Seiten und 208 Abbildungen. (Preis : 18 R.M.)

In English.

1935 697
ALLEN (J. R.) & WALKER (J. H.).
Heating and air conditioning.
London, W. C. 2. McGraw-Hill Publishing Co. Ltd., Aldwych House. Fourth edition. (Price : 24 sh. net.)

[1] The numbers placed over the title of each book are those of the decimal classification proposed by the Railway Congress njointly with the Office Bibliographique International, of Brussels. (See « Bibliographical Decimal Classification as applied to ailway Science », by L. WEISSENBRUCH, in the number for November 1897, of the *Bulletin of the International Railway Congress*, 1509).

1935 621 .43
ANDERSON (J. W.).
Diesel engines.
London, W. C. 2. McGraw-Hill Publishing Co. Ltd., Aldwych House. (Price : 21 sh. net.)

1935 385. (08 (.52)
GOVERNMENT OF JAPAN. DEPARTMENT OF RAILWAYS.
Annual report for the year ending, March 31st, 1934.
Tokyo. Printed at the Tokyo Tsukiji Type Foundry, Ltd. 300 pages, fig., tables and a map.

1935 621 .392
HARRIS (H.).
Metallic arc welding.
London. Edward Arnold & Company. (Price : 16 sh. net.)

1935 626 .131.4
JAPP (Sir Henry).
Modern methods and plant for excavations.
London, S. W. 1. The Institution of Civil Engineers. 43 pages & fig.

1935 66 &
LEA, (F. M.), M. Sc., A. I. C., & DESCH (C. H.), D
Ph. D., F. I. C., F. R. S.
The Chemistry of cement and concrete.
London. Edward Arnold and Co. (Price : 25 sh.)

1935 621 .43 &
NASH (A. W.) & HOWES (D. A.).
Principles of motor fuel preparation and applica
Vol. II.
New York. John Wiley & Sons. (10 × 6 inc
523 pages, illustr., diagrams, charts, tables. (Pr
$ 8.00.)

1934 623 &
SAYER (A. P.).
Special lecture on military bridging.
London, S. W. 1. The Institution of Civil Engin
Great George Street, 23 pages & fig.

1935 66
VOGEL (J. L. F.) & ROWDEN (W. F.).
Molybdenum steels : their manufacture and app
tion.
Widnes. Published by High Speed Steel Alloys,
103 pages. (Price : 5 sh.)

016. 385. (05]

II. — PERIODICALS.

In French.

Annales des Ponts et Chaussées (Paris).

1935 624 .8
Annales des ponts et chaussées, juillet, p. 14.
GUILLOT. — Note sur l'histoire et l'évolution des **ponts mobiles.** (13 000 mots & fig.)

1935 691
Annales des ponts et chaussées, juillet, p. 76.
CHALOS. — Application de la courbe de **résistance intrinsèque du béton** au calcul rationnel du béton armé. (2 800 mots, 2 tableaux & fig.)

1935 624 .63 (.44)
Annales des ponts et chaussées, août, p. 216.
VALENTIN. — Construction du **pont** de Bonnant sur la Loire. (4 200 mots & fig.)

Annales des travaux publics de Belgique. (Bruxelles.)

1935 62. (01 & 691
Annales des travaux publics de Belgique, octobre, p. 677.
DUTRON (R.). — La résistance des **tuyaux en béton** non soumis à pression intérieure et leurs essais de réception. (10 500 mots, 17 tableaux & fig.)

Arts et Métiers. (Paris.)

1935 625 .2 (.44) & 669 .1 (
Arts et Métiers, octobre, p. 216.
SEGARD (P.). — L'**allégement** du matériel rou de chemin de fer. (8 000 mots & fig.)

Bulletin de la Société des ingénieurs civils de France. (Paris.)

1935 691 &
Bull. de la Soc. des ing. civ. de France, mai-juin, p.
MARCOTTE (E.). — Caractéristiques thermiques **ciments.** (5 000 mots, 5 tableaux & fig.)

1935 625
Bull. de la Soc. des ing. civ. de France, mai-juin, p.
DUBOIS (G.). — Contribution à la recherche défauts internes dans les **bandages de roues** de che de fer. (1 000 mots & fig.)

1935 621
Bull. de la Soc. des ing. civ. de France, P. V., N
Séance du 8 novembre, p. 332.
HEIDMANN. — La **transmission Diesel-électr** (1 500 mots & fig.)

Bulletin de l'Union internationale des chemins de fer. (Paris.)

935 **385 .113 (.43)**

de l'Union intern. des ch. de fer, octobre, p. 309.
Compagnie des **Chemins de fer allemands** pendant rcice 1934. (6 000 mots.)

---

935 **385 .15 & 656 .237 .2**

de l'Union intern. des ch. de fer, octobre, p. 316.
cilités de paiement accordées par les Administra- de chemins de fer à leurs usagers. (8 500 mots.)

---

935 **385 .113 (.44)**

de l'Union intern. des ch. de fer, octobre, p. 325.
s Grands Réseaux de chemins de fer français pen- l'exercice 1934.(9 300 mots.)

Bulletin des transports internationaux par chemins de fer. (Berne.)

935 **347 .762**

des transp. intern. par ch. de fer, octobre, p. 395.
URCAULD (Max de). — De l'emploi éventuel de la **e de voiture** à ordre comme **titre unique dans les sports mixtes par fer et par mer.** (7 700 mots.)

---

935 **313 .385 (.494)**

des transp. intern. par ch. de fer, octobre, p. 428.
atistique des Chemins de fer fédéraux suisses pour et 1934. (600 mots.)

---

935 **656 .223.2 & 385 .63**

des transp. intern. par ch. de fer, novembre, p. 436.
ALASZ (A.). — La réglementation juridique inter- nale du transport des **wagons de particuliers.** (5 300 .)

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935 **385 .113 (.45)**

des transp. intern. par ch. de fer, novembre, p. 476.
sultats de l'exploitation des Chemins de fer italiens Etat pour l'exercice 1933-34. (500 mots.)

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letin technique de la Suisse romande. (Vevey.)

935 **691 (.44) & 721 .9 (.44)**

techn. de la Suisse romande, nº 23, 9 novembre, p. 265.
ROELE (H. W.). — Les nouvelles instructions çaises relatives à l'emploi du **béton armé.** (1 700 .) (A suivre.)

Chronique des transports. (Paris.)

935 **656 .231 (.44)**

nique des transports, nº 21, 10 novembre, p. 3.
réforme des tarifs des chemins de fer pour les ditions de 0 à 1 000 kilogr. (2 500 mots.)

Génie civil. (Paris.)

1935 **621 .13 (06 (.493) & 621 .335. (06 (.493)**

Génie civil, nº 2777, 2 novembre, p. 413; nº 2778, 9 novembre, p. 437.
MARTIN (H.). — Les **locomotives à vapeur et électriques** à l'Exposition universelle de Bruxelles (1935). (11 900 mots & fig.) (A suivre.)

1935 **624 .2**

Génie civil, nº 2777, 2 novembre, p. 429.
Abaques de M. Waddell donnant le poids des **poutres de pont.** (700 mots & fig.)

1935 **621 .392**

Génie civil, nº 2778, 9 novembre, p. 453.
Les récents progrès de la **soudure électrique par résistance.** (4 400 mots & fig.)

1935 **656 .222 (.73)**

Génie civil, nº 2779, 16 novembre, p. 475.
L'état actuel des **grandes relations ferroviaires** aux Etats-Unis. (2 400 mots & fig.)

1935 **621 .43**

Génie civil, nº 2780, 13 novembre, p. 485.
NICOLET (V.). — Les **autorails.** Doctrine générale de leur emploi et de leur constitution. (7 200 mots & fig.) (A suivre.)

Les Chemins de fer et les Tramways. (Paris.)

1935 **621 .132.3 (.42)**

Les Chemins de fer et les Tramways, novembre, p. 276.
SPIESS (E.). — La « **Silver Link** » L. N. E. R. (5 400 mots & fig.)

1935 **625 .1 (.44)**

Les Chemins de fer et les Tramways, novembre, p. 280.
VIÉ (G.). — **L'établissement des lignes nouvelles** sur le réseau P. L. M. (2 000 mots.)

1935 **621 .33 (.44)**

Les Chemins de fer et les Tramways, novembre, p. 282.
DUCHESNOY. — **L'électrification** de la ligne de Vierzon à Brive. (2 300 mots & fig.)

1935 **385. (09 (.63)**

Les Chemins de fer et les Tramways, novembre, p. 284.
Le **chemin de fer franco-éthiopien.** (2 100 mots & fig.)

1935 **625 .13**

Les Chemins de fer et les Tramways, novembre, p. 287.
CHARRIN (V.). — Creusement des grands **tunnels.** (1 400 mots & fig.)

1935 **656 .254**

Les Chemins de fer et les Tramways, novembre, p. 288.
GUIRAUD (E.). — Signaux routiers B. G. P. automatiques pour **passages à niveau** non gardés. (2 700 mots & fig.)

1935 **656 .225**

Les Chemins de fer et les Tramways, novembre, p. 292.

Transport par chemin de fer de véhicules particuliers. (3 200 mots & fig.)

Revue générale des chemins de fer. (Paris.)

1935 **625 .232 (.44)**

Revue générale des chemins de fer, novembre, p. 285.

CHATEL & YOLLANT. — Construction d'une **rame articulée constituée de trois voitures légères dans les Ateliers de la Compagnie du Chemin de fer du Nord.** (3 900 mots & fig.)

1935 **385. (06.4 (.493)**

Revue générale des chemins de fer, novembre, p. 299.

RENAUD. — Le matériel de chemins de fer à l'**Exposition universelle et internationale de Bruxelles.** (12 500 mots, 3 tableaux & fig.)

1935 **385 .113 (.493)**

Revue générale des chemins de fer, novembre, p. 331.

Le **huitième exercice** (1934) de la Société Nationale des Chemins de fer belges. (6 900 mots & fig.)

1935 **656 .212.8 (.44)**

Revue générale des chemins de fer, novembre, p. 341.

Pont à bascule de 50 120 tonnes à tablier de 7 m. 50 de longueur et à voie discontinue, ne comportant ni couteaux ni coussinets. (4 300 mots & fig.)

Revue politique et parlementaire. (Paris.)

1935 **388 (.44)**

Revue politique et parlementaire, 10 octobre, p. 135.

DIVISIA (F.). — **Revue des questions de transport.** (5 800 mots.)

Revue universelle des Mines. (Liége.)

1935 **625 .2 & 669**

Revue universelle des mines, novembre, p. 477.

RIGOLE (G.). — **L'allègement des véhicules de chemins de fer et de tramways.** (6 800 mots, 2 tableaux & fig.) (A suivre.)

1935 **385. (09.3 (.493)**

Revue universelle des mines, novembre, p. 488.

LAMALLE (U.). — Le **centenaire des chemins de fer belges.** (5 000 mots & fig.)

In German.

Elektrische Bahnen. (Berlin.)

1935 **621 .331 (.43)**

Elektrische Bahnen, September, S. 235.

Die **Steuerumrichter-Versuchsanlage** der Siemens-Schuckertwerke A.-G. im Reichsbahn-Saalachkraftwerk. (9 600 Wörter & Abb.)

1935 **621 .335 (.44**

Elektrische Bahnen, September, S. 250.

MICHEL (O.). — **Die elektrische Schnellzugslokomotive Achsfolge 2 Do 2 Reihe E 4801 der Midi-Eisenbahn** Gesellschaft. (2 000 Wörter & Abb.)

1935 **621 .33**

Elektrische Bahnen, September, S. 256.

SCHUNK (L.). — Ein neuzeitlicher Bürstenhalter f **elektrische Lokomotiven und Triebwagen.** (2 700 Wö ter & Abb.)

1935 **621 .335 (.43**

Elektrische Bahnen, Heft 10, Oktober, S. 265.

TASCHINGER (O.). — Der **Wechselstrom-Aussicht triebwagen.** (5 000 Wörter & Abb.)

1935 **621 .335 (.494**

Elektrische Bahnen, Heft 10, Oktober, S. 272.

STEINER (F.). — Die **elektrischen Leichttriebwage** der Schweizerischen Bundesbahnen (S. B. B.). (2 4 Wörter & Abb.)

1935 **621 .335 (.45**

Elektrische Bahnen, Heft 10, Oktober, S. 278.

GYSIN (O.). — **Akkumulatoren-Triebwagen** für it lienische Nebenbahnen. (3 000 Wörter & Abb.)

1935 **621 .**

Elektrische Bahnen, Heft 10, Oktober, S. 284.

STIX (R.). — Der **Anfahrvorgang** bei diesel-ele trischen Triebfahrzeugen. (2 500 Wörter & Abb.)

1935 **621 .3**

Elektrische Bahnen, Heft 10, Oktober, S. 288.

HUTT (H.). — Die Kennlinien von **Wechselstro Triebfahrzeugen.** (6 000 Wörter & Abb.)

1935 **625 .2**

Elektrische Bahnen, Heft 10, Oktober, S. 298.

GROSPIETSCH (K.). — **Leichtradsätze.** (3 800 Wö ter & Abb.)

Glasers Annalen. (Berlin.)

1935 **3**

Glasers Annalen, Heft 8, 15. Oktober, S. 65.

HAMMER (G.). — Die **Entwicklung der Wirtscha durch die Eisenbahnen.** (6 400 Wörter.)

1935 **621 .1**

Glasers Annalen, Heft 8, 15. Oktober, S. 71.

BAUMANN (H.). — Der « **feste Achsstand** » d Lokomotiven im Wandel der Zeiten und Vorschrift (3 500 Wörter & Abb.)

1935 **621 .132.8 (.4**

Glasers Annalen, Heft 8, 15. Oktober, S. 75.

BURMEISTER. — Die Entwicklung der **Turbine lokomotive** in Deutschland. (5 400 Wörter & Abb.)

935 **621 .13 (.43)**
ers Annalen, Heft 8, 15. Oktober, S. 89.
TZ (V.). — Der **deutsche Dampflokomotivbau** und e Bedeutung für die Ausfuhr. (3 800 Wörter &)

935 **621 .43 (.43)**
ers Annalen, Heft 8, 15. Oktober, S. 94.
'ARR (H.). — Neuere **Reichsbahn-Verbrennungs-wagen** grösserer Leistung. (3 500 Wörter & Abb.)

935 **621 .43 (.43) & 625 .258 (.43)**
ers Annalen, Heft 8, 15. Oktober, S. 98.
ECKEL. — Die **Magnetschienenbremse** an den elltriebwagen der Deutschen Reichsbahn. (4 400 ter & Abb.)

935 **621 .43**
ers Annalen, Heft 8, 15. Oktober, S. 105.
)EHME. — Ein neues kraftschlüssiges **Getriebe** für rennungskraftmaschinen. (1 700 Wörter & Abb.)

935 **656 .222.1**
ers Annalen, Heft 8, 15. Oktober, S. 112.
ENNINGHOFF. — Rückblick auf die **Versuchsfahr-** nit 200 km. Geschwindigkeit 1901-1903. (3 200 Wör- & Abb.)

935 **625 .24**
ers Annalen, Heft 8, 15. Oktober, S. 116.
'HINKE (J.). — Die neuere Entwicklung im **rwagenbau.** (4 700 Wörter & Abb.)

35 **621 .135.4 & 625 .215**
ers Annalen, Heft 8, 15 Oktober, S. 129.
)RDMANN. — Der **Krümmungswiderstand** der nbahnfahrzeuge. (5 300 Wörter.)

35 **385 (09.3)**
ers Annalen, Heft 8, 15. Oktober, S. 142.
ERNEKKE. — **Eisenbahnen** vor hundert Jahren heute. (5 600 Wörter & Abb.)

35 **621 .133.2**
ers Annalen, Heft 9, 1. November, S. 154.
)ESSLER (P.). — Die Brennkammer im **Lokomo-**ssel. (2 300 Wörter & Abb.)

an für die Fortschritte des Eisenbahnwesens. (Berlin.)

35 **625 .244 (.43)**
n für die Fortschritte des Eisenbahnwesens, Heft 21, 1. November, S. 415.
.SCHINGER. — **Kühlwagen** für den Fährbootver- nach England. (4 800 Wörter & Abb.)

35 **621 .138.2 (.43)**
n für die Fortschritte des Eisenbahnwesens, Heft 21, 1. November, S. 429.
EDLER (Gg.). — **Bekohlungsanlage** im Personen-hof Mannheim. (1 000 Wörter.)

1935 **621 .138.5 & 625 .26**
Organ für die Fortschritte des Eisenbahnwesens, Heft 21, 1. November, S. 431.
EBERT. — Der Stand des **Werkstättenwesens** in seiner letzten Entwicklung. (2 600 Wörter.)

1935 **621 .43 (.73) & 625 .251 (.73)**
Organ für die Fortschritte des Eisenbahnwesens, Heft 22, 15. November, S. 437.
WITTE (Fr.). — Die **Bremsausrüstung** der amerikanischen Schnelltriebwagenzüge mit Verzögerungsregelung. (3 500 Wörter.)

1935 **625 .253**
Organ für die Fortschritte des Eisenbahnwesens, Heft 22, 15. November, S. 440.
Die **Breda-Bremse** für Güterzüge. (2 300 Wörter.)

1935 **621 .132.1 (.44)**
Organ für die Fortschritte des Eisenbahnwesens, Heft 22, 15. November, S. 443.
Neuere **französische Lokomotiven.** (3 300 Wörter & Abb.)

Reichsbahn. (Berlin.)

1935 **621 .392 (.43)**
Reichsbahn, Nr. 28, S. 775.
MATTING STIELER. — Was Ausstellungen über die **Schweisstechnik** bei der Reichsbahn zeigten. (3 Seiten & Abb.)

1935 **385 .517.7 (.43)**
Reichsbahn, Nr. 29, S. 792.
NITSCHKE. — Die erste **Eigenheimsiedlung** für Reichsbahnarbeiter. (3 Seiten & Abb.)

1935 **656 .212.7 (.43)**
Reichsbahn, Nr. 35, S. 924.
JÜSGEN. — Das neue Zentrale **Güter- und Eilgutab-fertigungsgebäude** Köln-Gereon. (4 Seiten & Abb.)

1935 **656 .1 (.43)**
Reichsbahn, Nr. 36, S. 942.
VAN MARK. — **Bildung der Tarifentfernungen** im Güterkraftwagenverkehr der Reichsbahn. (2 Seiten.)

1935 **385 (06.4 (.43)**
Reichsbahn, Nr. 37, S. 955.
UEBELACKER. — Die **Ausstellung** « Hundert Jahre Deutsche Eisenbahnen » in Nürnberg. (21 Seiten & Abb.)

1935 **625 .156**
Reichsbahn, Nr. 39, S. 1013.
GOTTSCHALK. — Richtlinien für die Auswahl von **Bremsprellböcken.** (1 1/2 Seite.)

Verkehrstechnische Woche. (Berlin.)

1935 **621 .43**
Verkehrstechnische Woche, Nr. 27, S. 361.
FLEMMING. — **Motorkleinlokomotive** mit Voith-Flüssigkeitsgetriebe. (7 Seiten & Abb.)

1935 **656 .254**

Verkehrstechnische Woche, Nr. 27, S. 371.

WILCKENS. — Neuzeitliche **Warnanlagen** für Wegübergänge. (2 Seiten & Abb.)

1935 **388 (.43) & 656 .211 (.43)**

Verkehrstechnische Woche, Nr. 30, S. 398; Nr. 31, S. 413.

DERIKARTZ. — **Grossstädtische Bahnhofsanlagen** im Spiegel der Entwicklung der Städte und ihrer Verkehrsmittel. (17 Seiten.)

1935 **656 .225 (.42) & 656 .261 (.42)**

Verkehrstechnische Woche, Nr. 32, S. 425.

LILIENTHAL. — Der **Behälterverkehr** in England. (1 1/2 Seite.)

1935 **625 .14**

Verkehrstechnische Woche, Nr. 33, S. 433; Nr. 34, S. 451.

MÜLLER. — Neuere Verfahren auf dem Gebiete des **Gleisbaues.** (12 Seiten & Abb.)

1935 **725 .31 & 725 .32**

Verkehrstechnische Woche, Nr. 34, S. 445.

de la SAUCE. — Neuzeitliche **Umgestaltung alter Bahnhofsgebäude.** (6 Seiten & Abb.)

1935 **385 (.43)**

Verkehrstechnische Woche, Nr. 38, p. 493.

KLEINMANN. — **Eisenbahn und Aussenhandel.** (4 Seiten.)

1935 **656 (.43)**

Verkehrstechnische Woche, Nr. 39, S. 505.

MOST. — **Eisenbahn und Kraftwagen :** Fertigwarenindustrie und Auslandsgesetzgebung. (I. Nationale und internationale Bedingtheiten. — II. Die Fertigware im Mittelpunkt des Problems. — III. Wandlung und Beständigkeit der Eisenbahntarife. — IV. Werk- und Nahverkehr im In- und Ausland. — V. Konzessionssystem, Mindest- und Festtarife. — VI. Neue ausländische Gesetzgebung : ihre Voraussetzungen und Ziele : das deutsche Reichsgesetz vom 26. Juni 1935.) (7 Seiten.)

Zeitschrift des Vereines Deutscher Ingenieure. (Berlin.)

1935 **669**

Zeitsch. des Ver. deutsch. Ing., Nr. 45, 9. November, S. 1351.

HASE (R.). — **Temperaturmessung** an flüssigen und festen Metallen dargestellt am Beispiel des Eisens. (4 000 Wörter & Abb.)

1935 **536**

Zeitsch. des Ver. deutsch. Ing., Nr. 45, 9. November, S. 1359.

Rahmentafeln für Wasser und Wasserdampf nebst Erläuterungen. (4 000 Wörter.)

Zeitung des Vereins Mitteleuropäischer Eisenbahnverwaltungen. (Berlin.)

1935 **625**

Zeitung des Vereins mitteleurop. Eisenbahnverw., H
42, 17. Oktober, S. 879.

NEMESDY-NEMESEK. — Über den zeitgemäss
Oberbau. Gedanken und Vorschläge. (6 600 Wörter
Abb.)

1935 **385 .57 (.4**

Zeitung des Vereins mitteleurop. Eisenbahnverw., H
45, 7. November, S. 943.

SCHWARZE. — **Nachwuchsprobleme** bei der De
schen Reichsbahn. (5 100 Wörter.)

1935 **385 (.4**

Zeitung des Vereins mitteleurop. Eisenbahnverw., H
44, 31. Oktober, S. 927.

MEYER (R.). — Das **Eisenbahngesetz von 1921**
seiner Auswirkung auf die L. M. S. in England. (5
Wörter.)

1935 **385. (09 (.5**

Zeitung des Vereins mitteleurop. Eisenbahnverw., H
44, 31. Oktober, S. 933.

Die **Transindochinabahn** und ihre Stellung im V
kehrssystem des Fernen Ostens. (1 400 Wörter.)

1935 **624 .32 (.48**

Zeitung des Vereins mitteleurop. Eisenbahnverwa
Nr. 47, 21. November, S. 979.

MUNCK PETERSEN (C.). — Die **Eisenbahn-**
Strassenbrücke über den Kleinen Belt in Dänema
(4 200 Wörter & Abb.)

1935 **385 .113 (.48**

Zeitung des Vereins mitteleurop. Eisenbahnverwa
Nr. 47, 21. November, S. 987.

Die **Dänische Staatsbahn** im Geschäftsjahr 1934
(1 200 Wörter.)

In English.

Bulletin, American Railway Engineering Association. (Chicago, Ill.)

1935 **625 .12, 625 .17 & 656**

Bull., Amer. Ry. Engineering Association, July, p

LADD (G. E.). — **Landslides, subsidences and r**
falls. (29 000 words, fig. & bibliography.)

Engineer. (London.)

1935 **656 .211.7 &**

Engineer, No. 4162, October 18, p. 401.

DENNY (M. E.). — Development of **Cross-Cha**
steamers. (4 500 words.)

1935 **656 .28 (0**

Engineer, No. 4162, October 18, p. 405.

Railway accident reports. (1 900 words.)

935 627 .82
ineer, No. 4163, October 25, p. 420.
ILLIAMS (G. B.). — **Single-arch masonry dams.**
00 words & fig.)

---

935 621 .43 & 662
ineer, No. 4163, October 25, p. 433.
ICARDO (H. R.). — The progress of the internal
bustion engine and its fuel. (6 000 words.)

---

935 621 .18 (.42)
ineer, No. 4164, November 1, p. 462.
ailure of a boiler plate due to chemical embrittle-
t. (700 words.)

Engineering. (London.)

935 669
ineering, No. 3640, October 18, p. 422.
ie scaling of heated solid metals. (1 500 words.)

---

935 62. (01
ineering, No. 3640, October 18, p. 428.
n electromagnetic fatigue tester. (150 words & fig.)

---

935 621 .31
ineering, No. 3640, October 18, p. 429.
ILLER (J. L.). — **Surges in transmission lines**
transformers. (6 300 words & fig.)

---

935 621 .135.2
ineering, No. 3641, October 25, p. 439.
resses in the tyres of locomotive wheels. (3 100
ls.)

---

935 621 .94 (.42)
ineering, No. 3641, October 25, p. 459.
1/4 in. bar automatic lathe. (1 000 words & fig.)

---

935 62 (06 (.42)
ineering, No. 3642, November 1, p. 481.
ie British Association meeting at Norwich. Section
— Engineering. — **Lubrication.**

---

935 669 .1
Metallurgist, p. 67, Supplt. to the Engineer, Octo-
ber 25.
ise-hardening alloy steels. (1 700 words.)

---

935 669
Metallurgist, p. 71, Supplt. to the Engineer, Octo-
ber 25.
new method of extraction of gases in metals. (400
ls & 2 tables.)

---

935 669 .1
Metallurgist, p. 72, Supplt. to the Engineer, Octo-
ber 25.
ie influence of phosphorous on temper brittleness.
00 words & fig.)

1935 62. (01 & 669
The Metallurgist, p. 75, Supplt. to the Engineer, Octo-
ber 25.
Standardisation of the notched bar test piece. (1 500
words & fig.)

1935 62 (01 & 669 .1
The Metallurgist, p. 79, Supplt. to the Engineer, Octo-
ber 25.
Corrosion of mild steels containing copper (1 300
words.)

Engineering News-Record. (New York.)

1935 385 (072 (.73)
Engineering News-Record, No. 16, October 17, p. 542.
SCHLICK (W. J.). — **Current studies at Iowa State**
College. (2 700 words & fig.)

Journal, Institution of Engineers, Australia. (Sydney, N. S. W.)

1935 625 .62
Journal, Institut. of Engineers, Australia, p. 305.
MacLEAN (F. N.). — **Tramcar design.** (16 000 words
& fig.)

Journal, Western Society of Engineers. (Chicago.)

1935 656 .212 (.73) & 725 .32 (.73)
Journal, Western Society of Engineers, August, p. 147.
DOUGHERTY (E. A.). — **New York Central West**
Side improvement in New York City. (5 000 words &
fig.)

London & North Eastern Railway Magazine. (London.)

1935 621 .132.3 (.42) & 621 .132.8 (.42)
London & North Eastern Ry. Mag., November, p. 654.
« The Silver Jubilee ». Britain's first streamline
train. (1 800 words & fig.)

Mechanical Engineering. (London.)

1935 536
Mechanical Engineering, October, p. 618.
BERRY (C. H.). — **Thermodynamic properties of**
compressed liquid water. (1 400 words & fig.)

1935 62. (01
Mechanical Engineering, October, p. 621.
NICHOLS (J. T.). — **Metallic heat insulation.** (1 800
words & fig.)

1935 62 (01 & 669 .1
Mechanical Engineering, October, p. 625.
WYMAN (L. L.). — The creep of steels as influenced
by macrostructure. (2 100 words, 1 table & fig.)

1935 **62 (01 & 621 .15**
Mechanical Engineering, October, p. 628.
Recent development in **condenser tubes.** (2 500 words & fig.)

1935 **621 .116**
Mechanical Engineering, October, p. 633.
VAN HENGEL (G. H.) & STARKWEATHER (J. D.). — **An oil manometer.** — Description of a new instrument for measuring the absolute pressure of steam in condensers. (2 400 words & fig.)

1935 **621 .9 (064 (.73)**
Mechanical Engineering, October, p. 653.
Control — Precision — Production. (3 000 words & fig.)

Modern Transport. (London.)

1935 **347 .763 & 656**
Modern Transport, No. 866, October 19, p. 3.
HURCOMB (Sir Cyril). — **Transport organisation and legislation.** — Trend towards control and co-operation. (2 000 words.)

1935 **656 (.82)**
Modern Transport, No. 866, October 19, p. 4.
Transport proposals in Argentina. — National and local co-ordination schemes. (2 000 words.)

1935 **625 .1 (.42)**
Modern Transport, No. 866, October 19, p. 5.
Improvement of the Chester-Holyhead road. — **Tunnels and a viaduct** at Penyclip. (1 200 words & fig.)

1935 **656 .211. (.42)**
Modern Transport, No. 866, October 19, p. 7.
New **marshalling yard** for L. N. E. R. — Gravity operation and electric route selection at Mottram. (2 300 words & fig.)

1935 **621 .43 (.42)**
Modern Transport, No. 867, October 26, p. 3.
Development in A. E. C. **railcar design.** — Operation with trailer unit. (1 400 words & fig.)

1935 **656 .23 (.42)**
Modern Transport, No. 867, October 26, p. 4.
BIRD (C. K.). — Recent developments in **railway rates.** — Truck rates and agreed charges. (2 000 words.)

1935 **624 (.489)**
Modern Transport, No. 867, October 26, p. 5.
A rail and road bridge over the Great Belt. — An interesting Danish project. (1 300 words & fig.)

1935 **347 .763 (.41) & 656 .1 (.41)**
Modern Transport, No. 867, October 26, p. 9.
CLARKE (D. L.). — **Unification of road transport.** — The experiment in Northern Ireland. (1 300 words.)

1935 **656 (.4**
Modern Transport, No. 868, November 2, p. 13.
WEDGWOOD (Sir Ralph L.). — **Railways and ro transport.** — Progress towards coordination (2 4 words.)

1935 **621 .33 (.62) & 625 .62 (.4**
Modern Transport, No. 868, November 2, p. 16.
Progress in **trolleybus design.** — Light weight A. E — English electric unit. (1 300 words & fig.)

1935 **656. (4**
Modern Transport, No. 868, November 2, p. 17.
SHELMERDINE (F. C.). — **Air transport** in Gre Britain. — **Rivalry of high-speed trains.** (2 000 word

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Proceedings, American Society of Civil Engineer (New York.)

1935 **624**
Proceed., Amer. Soc. of Civil Engineers, October, p. 11
WEISKOPF (M. H.) & PICKWORTH (J. W.). **Tapered structural members** : an analytical treatme (4 000 words & fig.)

1935 **624**
Proceed., Amer. Soc. of Civil Engineers, October, p. 12
Structural beams in torsion. (4 000 words & fig.)

1935 **62. (**
Proceed., Amer. Soc. of Civil Engineers, October, p. 12
BRAHTZ (J. H. A.). — **Photo-elastic determinati of shrinkage stresses.** (600 words.)

1935 **62. (01 & 721**
Proceed., Amer. Soc. of Civil Engineers, October, p. 12
WILLIAMS (C. C.), KRYNINE (D. P.) & WI COXEN (L. C.). — Distribution of stresses under foundation. (5 000 words & fig.)

Railway Age. (New York.)

1935 **656 .212.8 (.7**
Railway Age, No. 16, October 19, p. 490.
LETZKUS (C. R.). — **Accurate track scales** — wh are the requirements ? (2 500 words & fig.)

1935 **621 .132.5 (.4**
Railway Age, No. 16, October 19, p. 493.
BABENKO (D.). — Russia builds **4-14-4 locomoti** (2 500 words, 1 table & fig.)

1935 **614 .8, 656 .222.1 & 656 .**
Railway Age, No. 16, October 19, p. 497.
WRIGHT (R. V.). — **Maintaining safety at hi speed.** (3 200 words.)

1935 **656 .2 (06 (.7**
Railway Age, No. 16, October 19, p. 500.
Passenger Traffic Officers meet at Cincinnati. Measures employed by carriers to increase revenu bring results — speed and equipment important fa tors. (4 000 words.)

935 **621 .139 (.73), 621 .8 (.73) & 625 .27 (.73)**
way Age, No. 16, October 19, p. 503.
eport on **stores handling.** (3 400 words & 1 table.)

935 **621 .3 (06 (.73)**
way Age, No. 16, October 19, p. 509.
ectric work on the railways. Air conditioning diesel
er; Welding add to duties of electrical specialists
enhance importance of their activities. (4 500
ls.)

Railway Engineering and Maintenance. (Chicago.)

935 **624 .1 (.71)**
way Engineering & Maintenance, October, p. 572.
hat about your **foundations ?** (4 000 words & fig.)

935 **721 .5**
way Engineering & Maintenance, October, p. 576.
oofs — Laying smooth-top rag felt and asphalt
ng. (1 100 words & fig.)

935 **625 .143.3**
way Engineering & Maintenance, October, p. 578.
rst report on **fissured rails.** (600 words.)

935 **625 .1 (06 (.73)**
way Engineering & Maintenance, October, p. 579.
admasters hold golden anniversary meeting. The
ling and distribution of ties. — Track maintenance,
y and tomorrow. — Maintenance, reclamation and
ir of frogs, switches, railroad crossings and other
k material and the economic limitations of this
tice. — North Shore reduces truck nosing. — Bal-
ng and resurfacing track. — Equipment, organi-
n and methods. — Recent developments in the
nization of track forces. — The maintenance of
ks in terminals. Organization, materials and
ods. (32 000 words.)

Railway Gazette. (London.)

35 **625 .4 (.43) & 656 .256.3 (.43)**
way Gazette, No. 16, October 18, p. 625.
tomatic signalling on the Barmen-Elberfeld Rail-
(2 400 words & fig.)

35 **625 .13 (.73)**
way Gazette, No. 16, October 18, p. 629.
w tunnel at Baltimore, Pennsylvania Railroad.
0 words & fig.)

35 **656 .212.5 (.42)**
way Gazette, No. 16, October 18, p. 631.
ottram and Dinting **marshalling yard,** L. N. E. R.
0 words & fig.)

35 **621 .132.5 (.73) & 621 .132.8 (.73)**
way Gazette, No. 16, October 18, p. 635.
w high-powered articulated American locomotive.
words & fig.)

1935 **656 .212.5 (.42)**
Railway Gazette, No. 16, October 18, p. 636.
Portable lighting for permanent way works. (600 words & fig.)

1935 **621 .134.1 (.42) & 621 .138.5 (.42)**
Railway Gazette, No. 17, October 25, p. 671.
The repair of locomotive **connecting rods** — I. (1 700 words & fig.) (To be continued.)

1935 **621 .132.8 (.47) & 621 .133.7 (.47)**
Railway Gazette, No. 17, October 25, p. 675.
ROOSEN (R. O.). — **Condensing goods locomotive** for Russia. (2 000 words & fig.)

1935 **656 .1 (.42)**
Railway Gazette, No. 17, October 25, p. 681.
London Transport Country Services Organization. (1 400 words, fig. & a map.)

1935 **621 .131.3 (.68) & 656 .222.1 (.68)**
Railway Gazette, No. 17, October 25, p. 689.
67 m. p. h. on the 3 ft. 6 in. gauge. — A notable **locomotive trial** on the South African Railways. (900 words, 1 table & fig.)

1935 **625 .172 (.82) & 625 .175 (.82)**
Railway Gazette, No. 18, November 1, p. 712.
CRESWELL (F. L.). — **Motor trolley maintenance** of permanent way in Argentina — II. (2 000 words & fig.)

1935 **621 .132.5 (.51)**
Railway Gazette, No. 18, November 1, p. 714.
New **4-8-4 locomotives** for China. (2 500 words & fig.)

1935 **656 .21 (.931) & 725 .3 (.931)**
Railway Gazette, No. 18, November 1, p. 720.
Wellington **new station.** New Zealand Railways. (1 200 words & fig.)

1935 **621 .138.5 (.42) & 621 .9 (.42)**
Railway Gazette, No. 18, November 1, p. 723.
New furnace and machine installations at Crewe Works. (1 600 words & fig.)

1935 **625 .245 (.42) & 656 .225 (.42)**
Railway Gazette, No. 18, November 1, p. 726.
British freight rolling stock. — III. L. N. E. Ry. exceptional load equipment and containers. (Fig.)

1935 **621 .43**
Diesel Ry. Traction, p. 746, Supplt. to Ry. Gazette, November 1.
LIPETZ (A. J.). — The potentialities of **Diesel traction.** A critical study of shunting and main-line applications. (4 300 words & fig.)

1935 **621 .43 (.54)**
Diesel Ry. Traction, p. 751, Supplt. to Ry. Gazette, November 1.
Small **Diesel locomotive** for India. (300 words & fig.)

1935 **621 .43 & 662**

Diesel Ry. Traction, p. 752, Supplt. to Ry. Gazette, November 1.

RICARDO (H. R.). — **The high-speed Diesel from the fuel point of view.** (2 000 words.)

1935 **621 .43 & 656 .222.1**

Diesel Ry. Traction, p. 754, Supplt. to Ry. Gazette, November 1.

Critical speeds and the railway diesel engine. (1 000 words & fig.)

1935 **621 .43 (.489)**

Diesel Ry. Traction, p. 755, Supplt. to Ry. Gazette, November 1.

High-power railcars for long-distance suburban work. (700 words & fig.)

1935 **621 .43 (.43)**

Diesel Ry. Traction, p. 756, Supplt. to Ry. Gazette, November 1.

Diesel traction with light cars in Westphalia. (400 words & fig.)

1935 **621 .43 (.52)**

Diesel Ry. Traction, p. 757, Supplt. to Ry. Gazette, November 1.

Light Diesel railcars in the Far East. (300 words & fig.)

1935 **621 .43 & 662**

Diesel Ry. Traction, p. 758, Supplt. to Ry. Gazette, November 1.

The testing of Diesel engines. — A special indicator developed to give accurate information required for the investigation of the fuel characteristics. (1 300 words & fig.)

1935 **621 .331 (.73)**

Electric Ry. Traction, p. 654, Supplt. to the Ry. Gazette, October 18.

North American **rectifier practice.** (1 300 words & fig.)

1935 **621 .335 (.44)**

Electric Ry. Traction, p. 658, Supplt. to the Ry. Gazette, October 18.

Paris-Orleans **high-power trial locomotive.** (750 words & fig.)

1935 **621 .338 (.43)**

Electric Ry. Traction, p. 660, Supplt. to the Ry. Gazette, October 18.

Glass topped **motor coaches** for Germany. (200 words & fig.)

Railway Mechanical Engineer. (Philadelphia.)

1935 **621 .132.3 (.73)**

Railway Mechanical Engineer, October, p. 415.

New **locomotives** on the Boston & Maine. — **Five** heavy Pacific type locomotives with 80-in. drivers, and five Mountain type locomotive with 73-in. drivers. (2 100 words & fig.)

1935 **621 (06 (.**

Railway Mechanical Engineer, October, p. 420.

Meeting of the International Railway General Fo men's Association, Chicago, September 17 and 18, 19 Report on automatic versus adjustable wedges. Report on lubrication. — Report on safety. (3 words.)

1935 **625 .234 (.**

Railway Mechanical Engineer, October, p. 425.

A self-propelled air-conditioning system. (1 900 wo & fig.)

1935 **261 .133.2 (.**

Railway Mechanical Engineer, October, p. 428.

Corrugations increase life of the firebox sheets. (words & fig.)

Railway Signaling. (Chicago.)

1935 **656. 254 (.**

Railway Signaling, October, p. 513.

Remote control on the Texas & New Orleans. (1 words & fig.)

1935 **656 .258 (.**

Railway Signaling, October, p. 515.

Electric interlocking involves three roads at Ar rillo, Texas. (2 200 words & fig.)

1935 **656 .253 (.73) & 656 .254 (.**

Railway Signaling, October, p. 519.

Signaling rehabilitation on Pennsylvania-Read Seashore. (Merger of 25 separate interlockings int major plants. Coded continuous type cab-signal system was installed. (3 200 words & fig.)

1935 **656 .259 (.**

Railway Signaling, October, p. 523.

BENDER (F. W.). — **A.-C. primary power sup for auto-flag signals** on the C. R. of N. J. (1 000 wo & fig.)

1935 **656 .258 (.**

Railway Signaling, October, p. 525.

New York Central reconstructs interlocking destro by fire. (1 700 words & fig.)

1935 **656 .256.2 (.**

Railway Signaling, October, p. 527.

Remote-control on the seabord. (1 600 words & f

The Institution of Civil Engineers. (London

1935 **621 &**

Institut. of Civil Engineers, Selected Engineering Pap No. 173.

INGHAM (W. A.) & GEORGE (K. J.). — **De ciation of plant and machinery.** (2 500 words & 3 bles.)

1935 624 (.62)
titut. of Civil Engineers, Selected Engineering Papers, No. 176.
HOPKINS (Th. H.). — **The bridges of the Egyptian** ate Railways. (20 000 words & fig.)

1935 621 .6
titut. of Civil Engineers, Selected Engineering Papers, No. 178.
POOLE (R.). — **The theory and design of propeller-pe fans.** (12 000 words & fig.)

1935 627
titut. of Civil Engineers, Selected Engineering Papers, No. 180.
MALLAGH (T. J. S.). — **Caisson-sinking** at Planta-n Quay, Glasgow. (10 000 words & fig.)

The Oil Engine. (London.)

1935 064 (.493) & 621 .43 (.493)
e Oil Engine, May, p. 4.
Oil engines at Brussels Exhibition. (2 500 words & .)

1935 621 .43 (.73)
e Oil Engine, May, p. 11.
First opposed-piston locomotive engine 300 b. h. p. 00 r. p. m. unit weighing 20 lb per b. h. p. (300 rds & fig.)

1935 621 .43 (.73)
e Oil Engine, May, p. 10.
An 1 800 b. h. p. Diesel train. (1 200 words & fig.)

1935 621 .43 (.42) & 656 .25 (.42)
e Oil Engine, May, p. 26.
Safeguarding railway electrical signalling. (1 300 rds & fig.)

1935 621 .43 (.73)
e Oil Engine, May, p. 29.
MANN (Ch. F. A.). — **Four-stroke engines** for Ame-an trains. (800 words & fig.)

1935 621 .43 & 621 .8
e Oil Engine, May, p. 34.
Hydraulic transmission for Diesel locomotives. Units to 1 380 b. h. p. now being built.

The Locomotive. (London.)

1935 621 .135.1
e Locomotive, October 15, p. 303.
Weighing of locomotives. (800 words.)

1935 621 .132.3 (.42) & 621 .132.8 (.42)
e Locomotive, October 15, p. 305.
The « Silver Jubilee » train of the L. N. E. Ry. ord trial run. (3 200 words, 1 table & fig.)

1935 625 .232 (.42)
The Locomotive, October 15, p. 316.
New « Cornish Riviera » trains, G. W. Ry. (500 words & fig.)

1935 621 .134.3
The Locomotive, October 15, p. 322.
Advantages of **dry steam.** (600 words & fig.)

1935 656 .212.6 (.73)
The Locomotive, October 15, p. 328.
Wagon tipplers. (700 words & fig.)

Transactions, American Society of Mechanical Engineers. (New York.)

1935 536 & 621 .18
Transactions, A. S. M. E., October, p. 395.
HAWKINS (G. A.), SOLBERG (H. L.). — **The viscosity of water and superheated steam.** (3 600 words, 5 tables & fig.)

In Spanish.

Ferrocarriles y Tranvías. (Madrid.)

1935 385 (.460)
Ferrocarriles y Tranvías, octubre, p. 285.
Dictamen de la Comisión para el estudio de un proyecto de **ordenación ferroviaria.** (8 200 palabras.)

Hormigón y Acero. (Madrid.)

1935 691
Hormigón y Acero, octubre, p. 429.
CAMPUS (F.). — Esfuerzos producidos en el **hormigón** a consecuencia de las variaciones de volumen. (1 400 palabras & fig.)

Revista de Ingeniería industrial. (Madrid.)

1935 621 .333
Revista de Ingeniería industrial, octubre, p. 340.
QUIÑONERO (E.). — Ensayos de temperatura en **motores de tracción eléctrica.** (2 000 palabras & fig.)

Revista de Obras Públicas. (Madrid.)

1935 385 (.460)
Revista de Obras Públicas, n° 21, 1° de noviembre, p. 410.
REBOLLO (G.). — **Los ferrocarriles en construcción** y el paro obrero. (3 100 palabras.)

1935 624 .6 & 721 .4
Revista de Obras Públicas, n° 22, 15 de noviembre, p. 419.
PRIETO MORESI (J. E.). — **La arcada múltiple.** (1 900 palabras & fig.)

In Italian.

La tecnica professionale. (Firenze.)

1935 **621 .134.1**

La tecnica professionale, n° 11, novembre, p. 318.

DIEGOLI (M.). — **I cuscinetti delle bielle** nelle locomotive veloci. (3 000 parole & fig.)

L'Ingegnere. (Roma.)

1935 **624 .2**

L'Ingegnere, novembre, p. 821.

SOBRERO (L.). — **Il teorema dei 2n momenti** nei telai con aste di sezione variabile. (2 400 parole & fig.)

Rivista tecnica delle ferrovie italiane. (Roma.)

1935 **621 .33 (.45)**

Rivista tecnica delle ferrovie italiane, 15 ottobre, p. 249.

CIOCIA (D.). — Lo sviluppo delle **elettrificazioni** a corrente continua sulle Ferrovie dello Stato italiane. (8 000 parole & fig.)

1935 **621 .134.1**

Rivista tecnica delle ferrovie italiane, 15 ottobre, p. 272.

DUTTO (G.). — Nuovo processo degli **assi a gomito** per locomotive. (2 700 parole & 1 tabella.)

1935 **625 .141**

Rivista tecnica delle ferrovie italiane, 15 ottobre, p. 279.

PERFETTI (A.). — Esame comparativo tra il mulino a palle e l'apparecchio Deval per le prove sui pietrischi per **massicciate.** (2 200 parole.)

In Dutch.

De Ingenieur. (Den Haag.)

1935 **691 & 624 .1**

De Ingenieur, n° 11, 1 November, p. Bt. 79.

BOONSTRA (G. C.). — Toepassing van **beton voor brugfundeeringen.** (6 900 woorden & fig.)

Spoor- en Tramwegen. (Utrecht.)

1935 **725 .31 (.43)**

Spoor- en Tramwegen, n° 23, 5 November, p. 549; n° 24, 19 November, p. 577.

SCHELLING (H. G. J.). — Nieuwe **stationsgebouwen** te Duisbourg en te Oberhausen. (3 100 woorden & fig.)

1935 **621 .132.8 (.492)**

Spoor- en Tramwegen, n° 23, 5 November, p. 554.

LABRYN (P.). — Nederlandsche Spoorweg **locomotief serie 3700** in stroomlijnvorm. (2 000 woorden, 6 tabellen & fig.)

1935 **656 (.**

Spoor- en Tramwegen, n° 24, 19 November, p. 565.

Spoor en auto in Italie. (2 400 woorden.)

1935 **621 .132.1 (.**

Spoor- en Tramwegen, n° 24, 19 November, p. 568.

ROSENTHAL (G. A.). — **Stoomlocomotieven** de Est en de Alsace-Lorraine. (2 700 woorden & f

1935 **385. (06.4 (.4**

Spoor- en Tramwegen, n° 24, 19 November, p. 571.

Het **verkeerswezen** op de Tentoonstelling te Bru (1 600 woorden & fig.)

In Polish.

(= 91 885)

Inżynier Kolejowy. (Warszawa).

1935 **621 .43 (.438) = 91 .**

Inżynier Kolejowy, n° 8, p. 223.

OGUREK. — **Railcar** built by the Warsaw Loco tive Co., and by the Lilpop, Rau & Lœwenstein (9 000 words, diagr. & fig.)

1935 **656 (.438) = 91 .**

Inzynier Kolejowy, n° 8, p. 234.

VIRION. — **Development of the railway and high systems in Poland.** (3 150 words.)

1935 **621 .139 (.438) = 91 .**

Inzynier Kolejowy, n° 8, p. 238.

BUCZYNSKI. — **Calculation of the traction costs** some classes of locomotives on the Polish State R ways. (10 800 words.)

In Portuguese.

Gazeta dos caminhos de ferro. (Lisboa.)

1935 **624 (.4**

Gazeta dos caminhos de ferro, n° 1148, 10 de outu p. 419; n° 1149, 1 de novembro, p. 449.

A obra da Junta Autonoma das Estradas na **strucão de grandes pontes** de estrada. (3 600 pala & fig.)

In Jugoslav.

(= 91.882)

Saobračajni Pregled (Beograd.)

1935 **656 .254 (.497.1) = 91 .**

Saobracajni Pregled, n° 7, p. 237.

FORGIC. — **Control of traffic operation in** large stations (Jugoslav State Railways). (4 500 w & 1 graph.)

935 **625 .617 = 91 .882**
bracajni Pregled, n° 7, p. 242.
ACOVENKO. — **Traffic without transhipment be-
en standard-gauge and narrow-gauge lines.** (2 250
ds & fig.)

---

935 **621 .138.5 (.436) = 91 .882**
& 625 .26 (.436) = 91 .882
bracajni Pregled, n° 7, p. 245.
ARNER. — **Reorganisation of main workshop** on
Austrian Federal Railways. (8 100 words & fig.)

---

935 **656 .223.2 (.497.1) = 91 .882**
bracajni Pregled, n° 7, p. 255.
OLINAR. — The efficiency of the **goods rolling
k** on the Jugoslav State Railways (1929-1934
od). (2 700 words.)

---

935 **625 .143 = 91 .882**
bracajni Pregled, n° 8, p. 269.
ERCIGONJA. — **Methods used to prevent the
ening of bolts.** (5 400 words, diagr. & fig.)

---

935 **385 .1 (.497.1) = 91 .882**
bracajni Pregled, n° 8, p. 275.
AMPRECHT. — **The new Jugoslav law on State
unting** (in force on 1st April 1936), and the orga-
tion of the financial statistics of the Jugoslav
e Railways. (2 250 words.)

---

935 **656 .261 = 91 .882**
bracajni Pregled, n° 8, p. 277.
ORGIC. — **Transport of railway wagons on road
cles.** (2 700 words.)

---

935 **621 .335 (.47) = 91 .882**
bracajni Pregled, n° 8, p. 280.
AKOVENKO. — The new type of **standard electric
motives** in the U. S. S. R. (type VL-19-02). (2 250
ds.)

---

935 **656 .222.3 (.497.1) = 91 .882**
bracajni Pregled, n° 8, p. 284.
ORGIC. — Inclusion of **goods wagons** in passenger
n travelling at speeds over 60 km. (37 miles) an
— with special reference to the Jugoslav State
ways. (1 800 words.)

1935 **621 .131.1 (.47) = 91 .882**
Saobracajni Pregled, n° 8, p. 287.
JACOVENKO. — Principal steps taken by the U. S. S. R. Railways in order to increase the **efficiency of the locomotives.** (3 600 words.)

In Czech.

(= 91.886)

Zeleznicni Revue. (Praha.)

1935 **385 .1 = 91 .886**
Zeleznicni Revue, n° 13, p. 193.
HAJEK. — **Industrial management applied to railway operation.** (4 200 words.)

1935 **656 (.437) = 91 .886**
Zeleznicni Revue, n° 18, p. 273.
The Commission for Co-ordination of transport set up by the Czechoslovak Government starts its work. (2 100 words.)

Zprávy železničních inženýrů. (Praha.)

1935 **621 .43 = 91 .886**
Zprávy zeleznicnich inzenyru, n° 8, p. 116; n° 9, p. 127.
MICHALEK. — **Graphs of railcar working** (a study based on the report of Messrs. Dumas & Lévy. (7 100 words.)

1935 **656 .25 = 91 .886**
Zprávy zeleznicnich inzenyru, n° 8, p. 122; n° 9, p. 133.
SCHMID. — **Safety in railway operation.** — Safety should be the chief advantage of rail transport. (4 400 words.)

1935 **621 .132.1 (.437) = 91 .886**
Zprávy zeleznicnich inzenyru, No. 10, p. 147.
PROCHAZKA. — **New classes 464 o and 475 o locomotives** of the Czechoslovak State Railways. (2 200 words.)

M. Weissenbruch Co., Ltd., Printer of the King, 49, rue du Poinçon, Bruxelles.

MONTHLY BIBLIOGRAPHY OF RAILWAYS [1].

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16. 385. (02]

I. — BOOKS.

In French.

35 **62.** (02

enda Béranger pour 1936.

is et Liége, Librairie Polytechnique Béranger. net de poche, 392 pages et fig. (Prix : 16 fr. ais.)

35 **721.** (02

AMUS (E.).

enda Dunod 1936 : Bâtiment.

ris, Dunod. 1 volume de poche (55e édition). 480 et 69 fig. (Prix : 20 fr. français.)

35 **621. 135.2 & 625 .214**

ttes d'essieux S. K. F. pour chemins de fer.

ris (16e), Compagnie d'Applications mécaniques, venue de la Grande Armée. 1 volume, 102 pages 2 fig.

35 **669.** (02

AUD (R.).

enda Dunod 1936 : Métallurgie.

ris, Dunod. 1 volume de poche (52e édition). 420 et 61 fig. (Prix : 20 fr. français.)

35 **691.** (02

ESTIER (V.).

enda Dunod 1936 : Béton armé.

ris, Dunod. 1 volume de poche (9e édition), 380 et 211 fig. (Prix : 20 fr. français.)

35 **621 .3** (02

RCAULT (L.-D.).

enda Dunod 1936 : Electricité.

ris, Dunod. 1 volume de poche (55e édition), 408 et 118 fig. (Prix : 20 fr. français.)

35 **385 .57**

SON (R.).

sélection psychotechnique des travailleurs et les odes statistiques.

ris, Félix Alcan, 108, boulevard St-Germain. 1 bro- é (16 × 26), 47 pages.

1935 **621.** (02

IZART (J.).

Agenda Dunod 1936 : Construction mécanique.

Paris, Dunod. 1 volume de poche (55e édition), 428 pages et 184 fig. (Prix : 20 fr. français.)

1935 **385 .517** (.44)

L'effort social des Grands Réseaux de chemins de fer en faveur de leur personnel.

Paris, Musée Social, 5, rue Las Casas. 1 volume, 132 pages.

1935 **624 .92**

NACHTERGAL (A.).

Charpentes métalliques.

Uccle (Belgique), Nachtergal, A. 1 volume (21.5 × 28 cm.), 684 pages, 37 planches et 975 fig. (Prix : 175 fr. belges.)

1935 **385.** (02

PLACE (P.).

Agenda Dunod 1936 : Chemins de fer.

Paris, Dunod. 1 volume de poche (55e édition), 400 pages et 62 fig. (Prix : 20 fr. français.)

1935 **313 .385** (.437)

Statistique des chemins de fer tchécoslovaques pour 1934.

Praha, Tiskl Josef Pacl v. Strakonicich. 1 volume, 149 pages et 1 carte.

In German.

1935 **385.** (09.1 (.43)

Eisenbahnen im Deutschen Reich.

Berlin, Gea-Verlag. Amtliche Eisenbahnkarte, 6 Seiten. (Preis : 28 R.M.)

1935 **656 .235.4**

GÜNTHER (H.).

Die Kohlentarife der Deutschen Reichsbahn und ihre wirtschaftliche Bedeutung.

Pegau-Leipzig, Hermann Günther.1 Band, 164 Seiten.

(1) The numbers placed over the title of each book are those of the decimal classification proposed by the Railway Congress ointly with the Office Bibliographique International, of Brussels. (See « Bibliographical Decimal Classification as applied to lway Science », by L. Weissenbruch, in the number for November 1897, of the *Bulletin of the International Railway Congress*, 1509).

1935 385 .11

HILLMANN (S.).

Das Anlagenabschreibungs- und Amortisationsproblem bei Eisenbahnen.

Berlin, Heymanns, Carl und Wien, Österreichischer Wirtschaftsverlag, Kommanditgesellschaft, Payer & C°. 1 Band, 96 Seiten. (Preis : 4.20 R. M.)

1935 62. (03

KOCH (R.) und KIENZLE (O.).

Handwörterbuch der gesamten Technik und ihrer Hilfswissenschaften. 1 Band : A bis Kohlen. 2. Band : Kohlenbunker bis Zz.

Stuttgart und Berlin, Deutsche Verlags-Anstalt. 1 Band, 718 Seiten und Abbildungen. 2. Band, 788 Seiten und Abbildungen. (Preis je Band : 36 R. M.)

1935 621 .392

MELLER (K.).

Taschenbuch für die Lichtbogen-Schweissung.

Leipzig, S. Hirzel. 1 Band, 189 Seiten, 85 Abbildungen. (Preis : 5 R.M.)

1935 691 (02 & 721 .9 (02

NEUMANN (E.), SIEBERT (B.), ROLOFF (M.), KÖGLER (F.) und HARTMANN (Fr.).

Handbuch für Eisenbetonbau. — Strassen-, Eisenbahn-, Berg- und Tunnelbau. Herausgegeben von F. Emperger.

Berlin, Wilhelm Ernst & Sohn. 1 Band, 96 Seiten und Abbildungen. (Preis : 6.60 R.M.)

1935 385. (09.1) (.438)

RÜHLING (R.).

Eisenbahngeographie Polens.

Dresden, Dittert & C°. 1 Band, 100 Seiten mit 3 Karten. (Preis : 3 R.M.)

1935 385 .57

SPRENG (H.).

Psychotechnik.

Zürich und Leipzig, Nichans, M. 1 Band, 214 Seiten, 21 Zahlentafeln. (Preis : 3.90 R. M.)

1935 621

WEIHE (H.).

Maschinenkunde.

Berlin, Julius Springer. 1 Band, 322 Seiten, 634 Abbildungen. (Preis : 17.50 R.M.)

1935 621 .131.1 & 621 .133.1

WOLFGANG LÜBSEN.

Die Verbesserung der Wirtschaftlichkeit der Dampflokomotive durch konstruktive Massnahmen zur Senkung des Brennstoffverbrauchs.

Berlin, Julius Springer. 1 Band, 104 Seiten und Abbildungen.

1935 625 .233

WÖLKE (H.).

Die elektrische Beleuchtung von Eisenbahnfahrzeugen bei der Deutschen Reichsbahn.

Berlin, Verkehrswissenschaftliche Lehrmittelgesellschaft m. b. H. bei der Deutschen Reichsbahn. 1 Band, 251 Textabbildungen. (Preis : 5.90 R.M.)

In English.

1935 72

ALLEN (R. V.).

The resistance of piles to penetration.

London, S.W.1., E. and F. N. Spon Ltd., 57, H market. (Price : 10 sh. 6 d. net.)

1935 385 (09 (

CHENG LU (H. Lui Cheng), formerly Counsellor in Ministry of Railways.

The Chinese Railways : a historical survey of development of **railway construction.**

Shanghai. Published by the China United Pr 299, Szechwan Road. (Price : $ 6.00, with map.)

1935 38 &

DUNNAGE (J.-A.).

Transport and the public.

London, E. C. 4, George Routledge and Sons, L 68, Carter-lane. (Price : 6 sh. net.)

1935 3 (06 (.

Education for social control. A survey of proble objectives, methods, agencies, and foreign experie in the field of civic education.

Philadelphia, Pa., The American Academy of Polit and Social Science, 3457, Walnut Street. Novem 1935 issue of the Annals of the Academy. 242 pa

---

1935 621 .43

HALL (B.-J.) & HALL (B. Fairfaix).

Modern plant copying processes and equipment the engineer, the architect, the draughtsman and ph printer. A new and revised edition of blue print and modern plan copying.

London. Sir Isaac Pitman & Sons, Ltd. (Pri 5 sh. net.)

1935 347 .763 (

MAHAFFY (R. P.).

Highway and Road-Traffic Law.

London, W.1., Ed. Arnold and Co., 41, Maddox-str (Price : 15 sh. net.)

1935 62

MOORFIELD (S. H.) & WINSTANLEY (H.-H.).

Heat engines.

London, W.1., Ed. Arnold and Co., 41, Maddox-str (Price : 6 sh. 6 d. net.)

1935 385 .32 (.

SHARFMAN (I.-L.).

The Interstate Commerce Commission. Part III. Volume A.

New York. Published by the Commonwealth F (9 1/4 × 6 inches). 684 pages. (Price : $ 4.50.)

35 385. (09.1 (∞)
RAILWAY GAZETTE.
ond Overseas Railways Number containing a series articles dealing with recent railway progress in sh Dominions. Colonies and other countries where sh-owned railways are operated, and 65 pages of rations (typical scenes on Overseas Railways). ndon, S.W.1., The Railway Gazette, 31, Tothill t, Westminster. (Price : 2 shillings.)

35 656. (06 (.68)
ON OF SOUTH AFRICA. — Report of the Central Transportation Board for the year ended 31st h, 1935.
etoria. Government Printer. 38 pages and tables.

1935 624 .61 & 721 .4
VASUDEVAN (A.), assistant executive engineer, & SINGH (Gurdial), computor, in the Projects and Designs Section of the North Western Railway.
Simplified design of masonry arch by the elastic theory.
Delhi. The Manager of Publications. Technical paper No. 293. 24 pages, tables and fig. (Price : Annas 4 or 5 d.)

1935 62. (01 & 621
WILSON (W. K.).
Practical solution of torsional vibration problems.
London. Chapman & Hall, Ltd. (Price : 25 sh. net.)

016. 385. (05]

II. — PERIODICALS.

In French.

etin technique de la Suisse romande. (Vevey.)

35 691 (.44) & 721 .9 (.44)
techn. de la Suisse romande, n° 26, 21 décembre, . 301.
ROELE (H. W.). — Les nouvelles instructions aises relatives à l'emploi du **béton armé.** (2 700 .)

35 621 .335 (.494)
techn. de la Suisse romande, n° 26, 21 décembre, . 305.
tomotrice légère pour voie normale, de la Comie du chemin de fer des Alpes bernoises. (600 & fig.)

Chronique des transports. (Paris.)

35 656 (.44)
nique des transports, n° 22, 25 novembre, p. 4.
s décrets-lois et les **transports.** (6 000 mots.)

Génie civil. (Paris.)

35 621 .43
e civil, n° 2781, 30 novembre, p. 513.
COLET (V.). — Les **autorails.** Doctrine générale eur emploi et de leur constitution. (Suite et fin.) 0 mots & fig.)

35 669 .1
e civil, n° 2781, 30 novembre, p. 517.
ORTEVIN (A.). — Les impuretés et la purification acier. (6 100 mots.)

35 621 .43
e civil, n° 2781, 30 novembre p. 525.
ansmission Diesel-électrique, système Jeumont, autorails. (300 mots & fig.)

1935 656 .1 (.43)
Génie civil, n° 2782, 7 décembre, p. 545.
Les **autoroutes allemandes.** (1 500 mots & 1 carte.)

1935 62. (01 & 691
Génie civil, n° 24, 14 décembre, p. 563; n° 25, 21 décembre, p. 585.
MARCOTTE (E.). — La perméabilité des **mortiers** et **bétons** aux pétroles et nouvelles recherches sur les hydrofuges. (6 800 mots, 2 tableaux & fig.)

1935 669
Génie civil, n° 24, 14 décembre, p. 566; n° 25, 21 décembre, p. 588.
DESCROIX (L.). — Considérations sur l'état actuel de la **métallurgie** d'après le Congrès International des Mines, de la Métallurgie et de la Géologie appliquée (20-26 octobre 1935). (11 300 mots.)

L'Allègement dans les Transports. (Lucerne.)

1935 625 .2 & 669 .1
L'Allègement dans les transports, novembre-décembre, p. 138.
DUMAS (A.). — **Aluminium im Rollmaterial.** (2 500 mots & fig.)

1935 625 .2 & 669 .1
L'Allègement dans les transports, novembre-décembre, p. 148.
GOICOCCHEA (A. v.). — **Leichterer Wagenbau** bei meterspurigen Eisenbahnen. (1 700 mots & fig.)

La Traction électrique. (Paris.)

1935 621 .33 (.44)
La Traction Electrique, juillet-août, p. 64.
L'électrification des lignes de Paris à Sceaux et à Massy-Palaiseau. (3 700 mots & fig.)

Les Chemins de fer et les Tramways. (Paris.)

1935 **656 .254**

Les Chemins de fer et les Tramways, décembre, p. 304.

MOUTIER (A.). — **Signalisation des passages à niveau.** Block rail-route (système M.). (1 800 mots & fig.)

1935 **621 .138.5 (.44)**

Les Chemins de fer et les Tramways, décembre, p. 306.

L'organisation du travail de révision des pièces détachées dans les ateliers du P. O. (4 000 mots & fig.)

1935 **621 .134.3**

Les Chemins de fer et les Tramways, décembre, p. 308.

Transformation de locomotives à vapeur par **distribution à soupapes.** (2 300 mots & fig.)

1935 **625 .62**

Les Chemins de fer et les Tramways, décembre, p. 311.

Equipement de contrôle pour tramways et électrobus. (5 000 mots & fig.)

1935 **625 .255 & 625 .258**

Les Chemins de fer et les Tramways, décembre, p. 315.

Le **freinage électro-magnétique** sur rails. (3 200 mots & fig.)

1935 **625 .3 (.44 + .460)**

Les Chemins de fer et les Tramways, décembre, p. 317.

Le **transpyrénéen** des Aldudes. (2 000 mots & fig.)

1935 **669 .1**

Les Chemins de fer et les Tramways, décembre, p. 319.

Emploi des **aciers spéciaux** au nickel. (1 600 mots.)

1935 **656 .225**

Les Chemins de fer et les Tramways, décembre, p. 320.

Le **transport des denrées périssables** par isocadre. (3 600 mots.)

1935 **625 .13 (.44)**

Les Chemins de fer et les Tramways, décembre, p. 322.

CHARPIN (V.). — La **percée des Vosges** : Lusse Ste-Marie-aux-Mines. (2 000 mots & fig.)

L'Industrie des voies ferrées et des transports automobiles. (Paris.)

1935 **621 .43**

L'Ind. des voies ferrées et des transp. autom., octobre, p. 266.

LEVEL (F.). — Améliorations récentes et résultats acquis dans l'emploi des **automotrices.** (2 800 mots.)

L'Ossature métallique. (Bruxelles.)

1935 **621 .392 (.494) & 624 (.494)**

L'Ossature métallique, novembre, p. 576.

Ponts et charpentes soudés des Chemins de fer Fédéraux suisses. (500 mots & fig.)

1935 **621 .392 (.494) & 656 .211.5 (.49**

L'Ossature métallique, novembre, p. 584.

Les nouvelles **toitures des quais** de la gare de Genè Cornavin. (2 000 mots & fig.)

1935 **624**

L'Ossature métallique, décembre, p. 639.

LASSNER (H.). — La **construction à ossature m tallique,** ses principes fondamentaux, avantages et maines d'application. (1 400 mots & fig.)

Revue générale des chemins de fer. (Paris.)

1935 **621 .132.3 (.44) & 625 .2 (.**

Revue générale des chemins de fer, décembre, p. 3

PARMANTIER (A.). — **Le train aérodynamique L. M.** Influence du carénage sur la résistance de l' (4 300 mots & fig.)

1935 **385 .587 (.44) & 621 .9 (.**

Revue générale des chemins de fer, décembre, p. 3

PLU. — **L'organisation technique du travail** dans Ateliers Généraux du Matériel aux Chemins de fer l'Etat français. (5 700 mots & fig.)

1935 **385. (06.4 (.49**

Revue générale des chemins de fer, décembre, p. 4

RENAUD. — **Le matériel de chemins de fer à l'Exp** sition Universelle et Internationale de Bruxelles 19 (7 800 mots, 4 tableaux & fig.)

1935 **385 .113 (.**

Revue générale des chemins de fer, décembre, p. 4

Les **Chemins de fer de l'Etat italien** pendant l'ex cice 1er juillet 1933-30 juin 1934. (2 700 mots.)

1935 **621 .33 (.**

Revue générale des chemins de fer, décembre, p. 4

L'électrification de la ligne Augsbourg-Nurembe (1 500 mots & fig.)

1935 **621 .33 (.43**

Revue générale des chemins de fer, décembre, p. 4

L'électrification de la ligne des Tauern. (1 000 m & fig.)

1935 **656 .21**

Revue générale des chemins de fer, décembre, p. 4

La technique des grandes **gares de triage.** (2 mots & fig.)

Revue universelle des mines. (Liége.)

1935 **62. (01 & 621 .3**

Revue universelle des mines, décembre, p. 521.

DUSTIN (H.). — Considérations sur l'endurance assemblages soudés. (7 200 mots & fig.)

1935 **625 .2 & 669**

Revue universelle des mines, décembre, p. 532.

RIGOLE (G.). — **L'allègement des véhicules de c mins de fer et de tramways.** (6 700 mots & fig.)

In German.

Archiv für Eisenbahnwesen. (Berlin.)

935 **385. (09 (.43)**
ıiv für Eisenbahnwesen, Heft 5, September-Oktober, S. 1065.
ÜNZER (H.). — Die 15 Jahre **Saar-Eisenbahnen.** 000 Wörter und Abb.)

---

935 **385 .113 (.497.1)**
ıiv für Eisenbahnwesen, Heft 5, September-Oktober, S. 1195.
EMY & UHLICH. — Die **Jugoslawischen Eisenıen** in den Jahren 1932 und 1933. (6 000 Wörter.)

---

935 **385 (09 (.591)**
ıiv für Eisenbahnwesen, Heft 5, September-Oktober, S. 1217.
ANDAOUROFF (P.). — Die **birmanischen Eisenıen.** (6 800 Wörter und 1 Karte.)

---

935 **385 .113 (.43)**
ıiv für Eisenbahnwesen, Heft 5, September-Oktober, S. 1241.
ICHE. — Die **Deutsche Reichsbahn** im Geschäftsjahr . (2 000 Wörter.)

Die Lokomotive. (Wien.)

935 **621 .132.6 (.43)**
Lokomotive, November, S. 197.
C2- h2- **Stromlinien-Schnellfahr-Tenderlokomotive** ıe 61 der Deutschen Reichsbahn, gebaut von Henl & Sohn in Kassel. (1 400 Wörter und Abb.)

Elektrische Bahnen. (Berlin.)

935 **621 .33 (.43)**
ɛtrische Bahnen, Heft 11, November, S. 303.
ECKMANN. — Die Deutschen **elektrischen Bahnen** len letzten 100 Jahren. (1 100 Wörter und Abb.)

---

935 **621 .33 (.43)**
ɛtrische Bahnen, Heft 11, November, S. 305.
EICHEL (W.). — Die ersten **elektrischen Kleinıen** in Deutschland. (4 000 Wörter.)

---

935 **621 .33 (.43)**
ɛtrische Bahnen, Heft 11, November, S. 310.
FORR (Ph.). — Werdegang des **elektrischen Zugiebes** bei der vormals Preussisch Hessischen Eisenı und bei der Reichsbahn. (3 000 Wörter.)

---

935 **621 .33 (.43)**
ɛtrische Bahnen, Heft 11, November, S. 315.
LEICHMANN. — Werdegang des **elektrischen Zugiebes** bei den vormals Bayerischen Staatseisenbah- (7 200 Wörter und Abb.)

1935 **621 .335 (09 (.43)**
Elektrische Bahnen, Heft 11, November, S. 323.
SACHS (K.). — Die erste **elektrische Vollbahnlokomotive Europas** im Deutschen Museum. (1 900 Wörter und Abb.)

1935 **621 .335**
Elektrische Bahnen, Heft 11, November, S. 327.
BUCHHOLD. — Über das **Rattern elektrischer Triebfahrzeuge.** (2 400 Wörter und Abb.)

Glasers Annalen. (Berlin.)

1935 **621 .43**
Glasers Annalen, Heft 10, 15. November, S. 157.
HEUMANN. — Das **Anfahren von Triebfahrzeugen.** (7 500 Wörter und Abb.)

Organ für die Fortschritte des Eisenbahnwesens. (Berlin.)

1935 **624 .63 (.436)**
Organ für die Fortschritte des Eisenbahnwesens, Heft 23, 1. Dezember, S. 455.
PREYSSL (A.). — Die **Eisenbahnbrücke** über die Mur bei Bruck. (2 400 Wörter und Abb.)

1935 **624 .32 (.43)**
Organ für die Fortschritte des Eisenbahnwesens, Heft 23, 1. Dezember, S. 458.
WIELAND. — **Hebung der Strassenbrücke** über den Rangierbahnhof in Nürnberg. (900 Wörter und Abb.)

1935 **625 .113**
Organ für die Fortschritte des Eisenbahnwesens, Heft 23, 1. Dezember, S. 460.
SCHRAMM (G.). — Die Genauigkeit von **Gleisbogenabsteckungen** und die verschiedenen Absteckverfahren. (3 200 Wörter und Abb.)

1935 **621 .13 (0**
Organ für die Fortschritte des Eisenbahnwesens, Heft 23, 1. Dezember, S. 463.
NEESEN (F.) & LÖHR (F.). — Entwicklungsmöglichkeiten der **Dampflokomotive.** (4 700 Wörter und Abb.)

1935 **625 .143 (06 (.439**
Organ für die Fortschritte des Eisenbahnwesens, Heft 23, 1. Dezember, S. 471.
Dritte Internationale Schienentagung vom 8. bis 12. September 1935 in Budapest. (1 500 Wörter.)

Zeitschrift des Vereines Deutscher Ingenieure. (Berlin.)

1935 **385. (09 (.43)**
Zeitsch. des Ver. deutsch. Ing., Nr. 41, 12. Oktober, S. 1212.
REMY (K.). — Ideenwandel und Persönlichkeit in der **deutschen Eisenbahngeschichte.** (14 500 Wörter.)

1935 **656 .211 & 656 .212**
Zeitsch. des Ver. deutsch. Ing., Nr. 41, 12. Oktober, S. 1224.
BLUM (O.). — Neuzeitliche **Bahnhofsanlagen.** (1 200 Wörter.)

1935 **621 .131.3 & 621 .132.8**
Zeitsch. des Ver. deutsch. Ing., Nr. 41, 12. Oktober, S. 1226.
NORDMANN (H.). — Versuchsergebnisse mit **Stromlinien-Dampflokomotiven.** (3 200 Wörter und Abb.)

1935 **621 .43 (.43)**
Zeitsch. des Ver. deutsch. Ing., Nr. 41, 12. Oktober, S. 1229.
FUCHS (Fr.) & GRASSL (R.). — 1 400 P.S. — **Diesellokomotive** der Deutschen Reichsbahn mit Flüssigkeitsgetriebe. (2 600 Wörter und Abb.)

1935 **621 .335 (.43)**
Zeitsch. des Ver. deutsch. Ing., Nr. 41, 12. Oktober, S. 1233.
GANZENMÜLLER (A.). — Die **elektrischen Triebfahrzeuge** der Deutschen Reichsbahn. (4 200 Wörter und Abb.)

1935 **621 .392 & 625 .24**
Zeitsch. des Ver. deutsch. Ing., Nr. 41, 12. Oktober, S. 1237.
SCHINKE (J.). — Die Anwendung der **Schweissung im Güterwagenbau.** (2 200 Wörter und Abb.)

1935 **625 .23 (.43)**
Zeitsch. des Ver. deutsch. Ing., Nr. 41, 12. Oktober, S. 1240.
BODEN (Fr.). — Neuerungen im **Personenwagenbau** der Deutschen Reichsbahn. (2 400 Wörter, 2 Tafeln und Abb.)

1935 **625 .252**
Zeitsch. des Ver. deutsch. Ing., Nr. 41, 12. Oktober, S. 1244.
RECKEL (Fr.). — **Verbesserungen an der Klotzbremse** für schnellfahrende Eisenbahnfahrzeuge. (3 800 Wörter und Abb.)

1935 **625 .258 (.43)**
Zeitsch. des Ver. deutsch. Ing., Nr. 41, 12. Oktober, S. 1249.
GOTTSCHALK (P.). — Neuere **Gleisbremsen** der Deutschen Reichsbahn. (2 600 Wörter und Abb.)

1935 **625 .15 (.43)**
Zeitsch. des Ver. deutsch. Ing., Nr. 41, 12. Oktober, S. 1252.
HARTMANN (F.). — Die **Weichen** der Deutschen Reichsbahn. (2 400 Wörter und Abb.)

1935 **656 .1 (.43)**
Zeitsch. des Ver. deutsch. Ing., Nr. 41, 12. Oktober, S. 1256.
CULEMEYER (H.). — Der **Kraftwagen** im Dienst der Reichsbahn. (4 200 Wörter und Abb.)

1935 **621 .392 (.43) & 624 (.**
Zeitsch. des Ver. deutsch. Ing., Nr. 41, 12. Oktob
S. 1264.
DÖRNEN (A.). — **Geschweisste Stahlbrücken**
Deutschen Reichsbahn. (2 200 Wörter und Abb.)

1935 **621 .139 (.43), 625 .18 (.43) & 625 .27 (.**
Zeitsch. des Ver. deutsch. Ing., Nr. 41, 12. Oktob
S. 1268.
EMMELIUS (C.). — Das **Beschaffungswesen** bei
Deutschen Reichsbahn. (3 000 Wörter und Abb.)

1935 **669**
Zeitsch. des Ver. deutsch. Ing., Nr. 48, 30. Novemb
S. 1435.
HELMUT KLEIN (E.). — **Elektrolytische Zem**
tation von Eisen. (3 500 Wörter, 2 Tafeln und Ab

1935 **721**
Zeitsch. des Ver. deutsch. Ing., Nr. 48, 30. Novemb
S. 1439.
KALLEN (H.) & SCHRADER (H.). — Die Wa
behandlung von **Konstruktionsstählen** (2 800 Wör
und Abb.)

1935
Zeitsch. des Ver. deutsch. Ing., Nr. 48, 30. Novemb
S. 1445.
KOOPMANN (W.). — Die Normung der **Aluminiu**
legierungen. (2 300 Wörter.)

1935 **621**
Zeitsch. des Ver. deutsch. Ing., Nr. 48, 30. Novemb
S. 1447.
LIST (H.). — Die **Verbrennung im Motor** Erg
nisse neuer Forschungsarbeiten. (2 400 Wörter
Abb.)

1935 **656 .254 (.**
Zeitsch. des Ver. deutsch. Ing., Nr. 49, 7. Dezem
S. 1455.
STÄCKEL (W.). — Stand der **Zugbeeinflussu**
frage bei der Deutschen Reichsbahn. (2 300 Wö
und Abb.)

1935 **621 .392 & 625**
Zeitsch. des Ver. deutsch. Ing., Nr. 49, 7. Dezem
S. 1459.
SCHINKE (J.). — Die Anwendung der **Schweiss**
im Güterwagenbau. (6 000 Wörter und Abb.)

1935 **625 .23 (.**
Zeitsch. des Ver. deutsch. Ing., Nr. 49, 7. Dezem
S. 1467.
BODEN (Fr.). — Neuerungen im **Personenwagen**
der Deutschen Reichsbahn. (4 200 Wörter und Abb

1935 **656 .212.6 (**
Zeitsch. des Ver. deutsch. Ing., Nr. 49, 7. Dezem
S. 1472.
LUCAS (G.). — Der **Elektrokarren** im Dienste
Deutschen Eisenbahn. (900 Wörter und Abb.)

935 **385.** (09 (.51)
sch. des Ver. deutsch. Ing., Nr. 49, 7. Dezember, S. 1479.
e neuere Entwicklung der **chinesischen Eisenbah-** (600 Wörter und 1 Karte.)

935 **625** .143 (.06 (.439)
sch. des Ver. deutsch. Ing., Nr. 49, 7. Dezember, S. 1480.
ÜHNEL (R.). — **Untersuchungen an Schienen. te Internationale Schienentagung** in Budapest von is 12. September 1935. (1 200 Wörter.)

Zeitschrift für das gesamte Eisenbahn-Sicherungswesen. (Berlin.)

935 **656** .254 (.43)
schrift für das gesamte Eisenbahn-Sicherungswesen, Nr. 14, 1. November, S. 165.
ÜTGERT. — Die **selbsttätigen Warnanlagen an** rübergängen bei der Deutschen Reichsbahn. (2 900 ter und Abb.) (Schluss.)

935 **656** .256.3
schrift für das gesamte Eisenbahn-Sicherungswesen, Nr. 14, 1. November, S. 175.
EYER (K.). — **Lichtsignalschaltung** für Dreipha-Wechselstrom und ihre Anwendung im selbsttätigen ckenblock. (2 700 Wörter und Abb.)

935 **625** .162 (.43)
schrift für das gesamte Eisenbahn-Sicherungswesen, Nr. 14, 1. November, S. 179.
UDDENBERG. — Die **Reichsbahnschranke.** (2 500 ter und Abb.)

935 **656** .254
schrift für das gesamte Eisenbahn-Sicherungswesen, Nr. 16, 10. Dezember, S. 187.
ROST (K.). — **Behelfseinrichtungen zur Vermei-g von Fahrgeschwindigkeitsbeschränkungen** bei Ar-en und Störungen an Sicherungsanlagen. (2 400 ter und Abb.)

Zeitung des Vereins mitteleuropäischer Eisenbahnverwaltungen. (Berlin.)

935 **656** .223.2
ung des Vereins mitteleurop. Eisenbahnverwalt., Nr. 49, 5. Dezember, S. 1025.
AIER (O.). — Der heutige Stand des internationa-Frachtrechts der **Privatgüterwagen.** (2 800 Wör-

935 **621** .33 (.474.57)
ung des Vereins mitteleurop. Eisenbahnverwalt., Nr. 50, 12. Dezember, S. 1052.
ROFEJEFF (N.). — **Elektrisierung** der Sowjet-ıbahnen. (2 500 Wörter.)

935 **621** .335 (.43)
ung des Vereins mitteleurop. Eisenbahnverwalt., Nr. 50, 12. Dezember, S. 1060.
e **Aussichtstriebwagen** der Deutschen Reichsbahn. Wörter und Abb.)

In English.

Bulletin, American Railway Engineering Association. (Chicago, Ill.)

1935 **625** .1 (06 (.73)
Bull., Amer. Ry. Engineering Association, August, p. 1.
Revisions and additions to the manual, Part I : Roadway. — Rail. — Track. — Buildings. — Wooden bridges and trestles. — Masonry. — Highways. — Rules and organization. — Water service, fire protection and sanitation. — Yards and terminals.

1935 **625** .1 (06 (.73)
Bull., Amer. Ry. Engineering Association, September, p. 1.
Revisions and additions to manual, Part II : Iron and steel structures. — Wood preservation. — Uniform general contract forms. — Economics of railway labor. — Shops and locomotive terminals. — Waterways and Harbors. — Public improvement projects, their costs and benefits. — Allocation of expense for the construction, maintenance and operation of bridges over navigable waterways. — Waterproofing of railway structures.

Engineer. (London.)

1935 **621** .43 (.42)
Engineer, No. 4165, November 8, p. 477.
A new 260 h.p. **railcar.** (3 500 words and fig.)

1935 **62.** (01 (.42) & **621** (06 (.42)
Engineer, No. 4165, November 8, p. 484.
GOUGH (H.-J.) & POLLARD (H.-V.). — **Combined alternating stresses.** (Paper presented at the Institution of Mechanical Engineers, November 1, 1935.) (3 200 words and fig.)

1935 **621** (064 (.42)
Engineer, No. 4165, November 8, p. 486; No. 4166, November 15, p. 517.
Commercial Motor Transport Exhibition. (8 700 words and fig.)

1935 **621.** (06 (.42) & **621** .4 (.42)
Engineer, No. 4166, November 15, p. 500.
ADVENTURE. (Colonel A. E. DAVIDSON.) — Address by the President of the Institution of Mechanical Engineers. (7 700 words, 4 tables and fig.)

1935 **656** (064 (.42)
Engineer, No. 4166, November 15, p. 505.
The Public Works, Roads, and Transport Exhibition. (5 400 words and fig.)

1935 **621** .43 (.42) & **621** .8 (.42)
Engineer, No. 4166, November 15, p. 510.
An automatic gear changing locomotive. (2 000 words and fig.)

1935 **625** .13 (.42) & **697** (.42)
Engineer, No. 4166, November 15, p. 512.
The Mersey Tunnel **ventilating system.** (1 800 words and fig.)

1935 **621 .331 (.42)**
Engineer, No. 4166, November 15, p. 515.
Rectifier sub-stations. (1 400 words.)

1935 **621 .4 (064 (.42)**
Engineer, No. 4167, November 22, p. 545.
Commercial Motor Transport Exhibition. No. III. (3 700 words and fig.) (To be continued.)

1935 **621 .392**
Engineer, No. 4167, November 22, p. 549.
A new high frequency **arc welding set.** (1 000 words and fig.)

1935 **656 (064 (.42)**
Engineer, No. 4169, December 6, p. 586.
The Public Works, Roads, and Transport Exhibition. (7 600 words and fig.)

1935 **62. (01**
Engineer, No. 4169, December 6, p. 592.
BAILEY (R. W.). — Utilisation of **creep test** data in engineering design. (4 500 words and fig.)

1935 **621 .134.1 & 621 .8**
Engineer, No. 4169, December 6, p. 597.
Geared locomotives. (1 000 words.)

1935 **625 .142.2 (.42) & 691 (.42)**
Engineer, No. 4169, December 6, p. 600.
New G. W. R. **sleeper creosoting depot.** (2 000 words and fig.)

1935 **621 .134.1 & 621 .8**
Engineer, No. 4169, December 6, p. 602.
The geared locomotive. (1 500 words.)

Engineering. (London.)

1935 **621 .4 (064 (.42)**
Engineering, No. 3643, November 8, p. 493; No. 3644, November 15, p. 519.
The Commercial Vehicle Exhibition at Olympia. (9 500 words and fig.) (To be continued.)

1935 **62. (01 (.42) & 621 (06 (.42)**
Engineering, No. 3643, November 8, p. 506.
GOUGH (H.-J.) & POLLARD (H.-V.). — **The strength of metals under combined alternating** stresses. (5 400 words.) (Discussion.)

1935 **62. (01 (.42) & 621 (06 (.42)**
Engineering, No. 3643, November 8, p. 511.
GOUGH (H.-J.) & POLLARD (H.-V.). — **The strength of metals under combined alternating stresses.** (Paper read before the Institution of Mechanical Engineers, November 1, 1935. Abridged.) (3 000 words and fig.)

1935 **621 .132.8 (.42) & 621 .135.2 (.42)**
Engineering, No. 3644, November 15, p. 524.
Timken bearings on the London Midland & Scottish Railway turbine locomotive. (1 300 words and fig.)

1935 **621 .132.3 (.**
Engineering, No. 3644, November 15, p. 532.
The London Midland & Scottish **Railway locomot**
« British Legion ». (700 words and fig.)

1935 **62. (01 (.42) & 621 (06 (.**
Engineering, No. 3644, November 15, p. 541.
GOUGH (H.-J.) & POLLARD (H.-V.). — **The stren**
of metals under combined alternating stresses. (Pa
read at the North Western Branch of the Institut
of Mechanical Engineers, October 17, 1935.) (2
words.)

1935 **656 (06 (.**
Engineering, No. 3645, November 22, p. 543; No. 3
December 6, p. 599.
The Public Works, Roads and Transport Exhibiti
(17 300 words and fig.) (To be continued.)

1935 **621 .132.8 (.42) & 621 .135.2 (.**
Engineering, No. 3645, November 22, p. 552.
Timken bearings on the London Midland & Scott
Railway turbine locomotive. (900 words and fig.)

1935 **656. (06 (.**
Engineering, No. 3645, November 22, p. 559.
Public Works, Roads and Transport Congress.
The drainage of Greater London. — Reinforced-
crete construction. — Public lighting. — The use
gas in buildings. — The use of coke in buildi
(4-100 words.)

1935 **62. (01 & 721**
Engineering, No. 3645, November 22, p. 563.
GLANVILLE (W.-H.), GRIME (G.) & DAVIES (
W.). — The behaviour of **reinforced-concrete p**
during driving. (3 000 words and fig.)

1935 **62. (01 & 621 (06 (.**
Engineering, No. 3645, November 22, p. 565.
GOUGH (H.-J.) & POLLARD (H.-V.). — **The stren**
of metals under combined alternating stresses. (2
words, 4 tables and fig.)

1935 **62. (01 (.42) & 621 (06 (.**
Engineering, No. 3646, November 29, p. 587.
The utilisation of **creep test** data in engineering
sign. Paper presented by Mr. R. W. BAILEY at
Institution of Mechanical Engineers, November
1935. (5 800 words.)

1935 **669**
Engineering, No. 3646, November 29, p. 593.
GREAVES (R.-H.). — **The properties of some l**
nickel steels containing manganese. (1 800 words
tables and fig.)

1935 **62. (01 & 621 (06 (.**
Engineering, No. 3646, November 29, p. 595.
BAILEY (R.-W.). — The utilisation of **creep t**
data in engineering design. (3 900 words and fig.)

1935 **621 (06 (.42) & 656 (.**
Engineering, No. 3647, December 6, p. 621.
The Institution of Mechanical Engineers. — P
idential Address by Colonel A. E. DAVIDSON. (
ridged.) (3 300 words and tables.)

Engineering News-Record. (New York.)

935 **721 .1 (.73)**
gineering News-Record, No. 17, October 24, p. 559.
APPEL (C.-G.). — **Five-story building moved on steel spools.** (1 400 words and fig.)

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935 **624 .2**
gineering News-Record, No. 17, October 24, p. 571.
ROSS (H.). — **Limitations and application of structural analysis.** (3 400 words.)

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935 **721 .5**
gineering News-Record, No. 19, November 7, p. 635.
hin **concrete shell roof** tested under large unsymrical load. (1 000 words and fig.)

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935 **385 (09 (.73)**
gineering News-Record, No. 19, November 7, p. 643.
TEVENS (J.-F.). — An engineer's recollections. . — **Modernizing operations of the New Haven road.** (3 900 words.)

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935 **624 .51 (.73)**
gineering News-Record, No. 18, October 31, p. 593.
URCELL (C.-H.), ANDREW (Ch.-E.) & WOODFF (G.-B.). — **Cable anchorages** San Francisco-land bridge. (2 500 words and fig.)

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935 **625 .13 (.42)**
gineering News-Record, No. 18, October 31, p. 597.
onstruction in England from an engineer's notebook. A notable scheme developed for **demolition of Waoo bridge without interfering with river traffic, etc.** 00 words and fig.)

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935 **624 (.73)**
gineering News-Record, No. 20, November 14, p. 677.
cCULLOUGH (Conde B.). — Remarkable series of ges on Oregon Coast highway. (850 words and

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Great Western Railway Magazine. (London.)

935 **625 .13 (.42)**
EAT Western Ry. Magazine, November, p. 597; December, p. 643.
HACKLE (C.-E.). — Interesting **bridgework** on the tol (Temple Meads) improvement scheme. (1 200 ds and fig.) (To be continued.)

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rnal, Institution of Civil Engineers. (London.)

935 **385 (091 (.66)**
rnal Institut. of Civil Engineers, November, p. 49.
NDLEY (H.-D.). — **Sudan Railways,** 1925-1935. 00 words and fig.)

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935 **624 .2**
nal, Institut. of Civil Engineers, November, p. 67.
ATEMAN (E.-H.). — **The open-frame girder.** (2 800 ds, 11 tables and fig.)

1935 **62. (01 & 721 .2**
Journal, Institut of Civil Engineers, November, p. 94.
STROYER (J.-P.-R.-N.). — **Earth-pressure on flexible walls.** (17 000 words, fig. and tables.)

1935 **526**
Journal, Institut. of Civil Engineers, November, p. 140.
HOTINE (M.). — **Surveying from air photographs.** (3 900 words and fig.)

Journal, Institution of Engineers, Australia. (Sydney, N. S. W.)

1935 **62. (01**
Journal, Institut. of Engineers, Australia, October, p. 345.
GIBSON (W.-H.-H.). — Model experiments in **stress distribution.** (8 500 words and fig.)

1935 **656 (.94)**
Journal, Institut. of Engineers, Australia, October, p. 356.
CHAPMAN (R.-H.). — **Two major transportation problems.** (6 000 words and fig.)

Journal, Institute of Transport. (London.)

1935 **656 (.42)**
Journal, Institute of Transport, November, p. 8.
HURCOMB (Sir Cyril). — Progress in the **co-ordination of transport** in Great Britain. (20 000 words.)

1935 **656 .225 (.42)**
Journal, Institute of Transport, November, p. 28.
SHERRINGTON (C.-E.-R.). — **Handling of heavy suburban traffic.** (4 000 words.)

1935 **38**
Journal, Institute of Transport, November, p. 33.
HARDY (J.-A.). — **The desirability of monopolies in transport.** (3 600 words.)

1935 **351 .81 (.42)**
Journal, Institute of Transport, November, p. 38.
Some aspects of the work of the Ministry of Transport. (5 300 words.)

London & North Eastern Railway Magazine. (London.)

1935 **656 .212.5 (.42)**
London & North Eastern Ry. Magazine, December, p. 697.
JENKINSON (J.-A.). — Mottram new down **marshalling yard.** (1 600 words and fig.)

Mechanical Engineering. (New York.)

1935 **721 .5**
Mechanical Engineering, November, p. 687.
WILLIAMS (D.-G.). — **Effect of insulation on the surface temperatures of the contents of galvanized corrugated-iron sheathed buildings.** (2 800 words and fig.)

1935 **536**
Mechanical Engineering, November, p. 700.
STEELE (S.). — **Separation of radiation and convection heat losses.** (3 500 words and fig.)

1935 **621 .165**
Mechanical Engineering, November, p. 705.
BERRY (C.-H.). — **Steam-turbine testing.** (4 800 words, 2 tables and fig.)

1935 **536 & 62 (08**
Mechanical Engineering, November, p. 710.
The third international Conference on Steam Tables. (1 500 words and 3 tables.)

Modern Transport. (London.)

1935 **385 .1 (.42)**
Modern Transport, No. 869, November 9, p. 17.
Are British Railways over-capitalised ? — No. 1. — The meaning of « watered capital ». (2 500 words.) (To be continued.)

1935 **621 .43 (.41)**
Modern Transport, No. 869, November 9, p. 19.
Bus converted into railcar. — An Irish railway development. (900 words and fig.)

1935 **385 .1 (.42)**
Modern Transport, No. 869, November 9, p. 21.
Government guarantee for railway works. £ 30 000 000 programme. (1 200 words.)

1935 **656 .1 (.42)**
Modern Transport, No. 870, November 16, p. 3.
HARDIE (N.-A.). — **Developments in the motor industry.** — Legislation and its effect on progress. (2 000 words.)

1935 **385 .1 (.42)**
Modern Transport, No. 870, November 16, p. 9.
Are British railways over-capitalised ? — No. 2. — The problem of writing down : a possible solution. (2 000 words.)

1935 **621 .43**
Modern Transport, No. 870, November 16, p. 11.
FAIRBURN (C.-E.). — **Diesels for railway traction** on passenger lines and shunting. (1 800 words.)

1935 **621 .43 & 621 .8**
Modern Transport, No. 870, November 16, p. 13.
The Cotal transmission system. — Application to Guy chassis. (1 000 words and fig.)

1935 **621 .132.3 (.4**
Modern Transport, No. 870, November 16, p. 14.
Rebuilding of L. M. S. locomotives. — **Tapered b**lers for « Royal Scot » engines. (700 words and fi

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1935 **6**
Modern Transport, No. 870, November 16, p. 27.
GOSSELIN (C. le M.). — **The railways and ro**transport. — Present position reviewed. (2 000 word

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1935 **385 .1 (.4**
Modern Transport, No. 871, November 23, p. 3.
WOOD (W.-V.). — **Are British railways over-ca**talised? — No. 3. (2 800 words.)

1935 **6**
Modern Transport, No. 871, November 23, p. 4.
The railways and road transport. (2 100 words.)

1935 **621 .132.5 (.5**
Modern Transport, No. 871, November 23, p. 5.
British-built locomotives for Canton-Hankow Ra way. (**4-8-4 engines with 12-wheeled tenders.**) (1 words and fig.)

1935 **385**
Modern Transport, No. 871, November 23, p. 6.
DAVIES (A.). — **National aspect of railways.** (2 words.)

1935 **621**
Modern Transport, No. 871, November 23, p. 7.
Diesel units for railway traction. (2 600 words.)

1935 **656 .**
Modern Transport, No. 871, November 23, p. 12.
Road vehicles for railway service. (2 100 words.)

1935 **385 .1 (.**
Modern Transport, No. 872, November 30, p. 3.
MANCE (Sir H.-O.). — **Revaluation of railw**capital. (2 200 words.)

1935 **656 (**
Modern Transport, No. 872, November 30, p. 4.
Transport in Latin America. — **New air services.** Railways in Argentina. (1 600 words.)

1935 **388 (.42) & 625 .4 (.**
Modern Transport, No. 872, November 30, p. 5.
Tube trains to North and East London. (1 words and fig.)

1935 **621 .43 & 656 .22**
Modern Transport, No. 872, November 30, p. 6.
DAVIDSON (A.-E.). — **Problems of speed in tra**port. — The coefficient of friction. (2 900 words 1 table.)

1935 **621 .43 (.**
Modern Transport, No. 872, November 30, p. 7.
Railcars in Northern Ireland. — Results in da service. (2 500 words and fig.)

935 621 .33 (.42)
lern Transport, No. 872, November 30, p. 9.
ailway electrification in Great Britain. (1 700 ds.)

ceedings, American Society of Civil Engineers. (New York.)

935 624 .2
eed., Amer. Soc. of Civil Engineers, November, p. 1327.
HOEMAKER (L.-H.). — **Truss deflections : The el deflection method.** (1 600 words, 3 tables and

935 62. (01 & 624 .1
eed., Amer. Soc. of Civil Engineers, November, p. 1335.
EAGIN (L.-B.). — **Lateral pile-loading tests.** (5 000 ds and fig.)

ceedings, Institution of Mechanical Engineers. (London.)

935 621 .116 & 621 .18
eed., Institut. of Mech. Eng., Vol. 129, p. 7.
LINN (R.-J.). —The care of **modern steam gene-ng plant** from the water side. (Paper and discus-.) (26 000 words and fig.)

935 621 .83
eed., Institut. of Mech. Eng., Vol. 129, p. 127.
ERRITT (H.-E.). — **Worm gear performance.** per and discussion.) (26 000 words and fig.)

935 621 .43
eed., Institut. of Mech. Eng., Vol. 129, p. 197.
EDDEN (A.-H.-R.). — Symposium of papers on **rcharging.** (19 000 words and tables.)

935 62. (01
eed., Institut of Mech. Eng., Vol. 129, p. 251.
CHUSTER (L.-W.). — **The bend test,** and its value a guide to ductility. (Paper and discussion.) 000 words, tables and fig.)

935 621 .82
eed., Institut. of Mech. Eng., Vol. 129, p. 399.
WIFT (H.-W.). — Hydrodynamic principles of **nal bearing design.** (13 000 words and fig.)

935 621 .82
eed., Institut. of Mech. Eng., Vol. 129, p. 435.
ALESGRAVE (H.-L.). — Relation between theory, riment, and practice in **journal bearing design.** 00 words, tables and fig.)

Railway Age. (New York.)

935 621 .43
way Age, No. 17, October 26, p. 522.
hy the Diesel engine is a good railroad tool. (5 000 ds and fig.)

1935 347 .763 (.73)
Railway Age, No. 17, October 26, p. 528.
Regulators discuss Motor Carrier Act at annual convention, Nashville, Tenn., October 15-18, 1935. (4 300 words.)

1935 656 .258 (.73)
Railway Age, No. 17, October 26, p. 533.
STAHL (W.-A.). — **Interlockings consolidated** at Houston, Tex. (1 200 words and fig.)

1935 614 .8 (06 (.73)
Railway Age, No. 17, October 26, p. 535.
Safety Conference held at Louisville. (4 700 words.)

1935 625 .1 (06 (.73)
Railway Age, No. 17, October 26, p. 539.
Bridge and building Association holds successful meeting. Part I. — (5 000 words.)

1935 621 .43 (.73)
Railway Age, No. 18, November 2, p. 563.
« Mark Twain » Zephyr placed in service. (2 500 words and fig.)

1935 621 .134.1 (.73)
Railway Age, No. 18, November 2, p. 566.
Roller-bearing rods pass test service. (2 500 words, 1 table and fig.)

1935 625 .1 (06 (.73)
Railway Age, No. 18, November 2, p. 577.
Bridge Men meet at Chicago. — Reports on cleaning steel bridges, inspection of bridges, treated timber in buildings, welding of pipes, bridge floors, pumps, and sub-aqueous inspections embody valuable information. — Part II. (7 000 words.)

1935 621 .335 (.73) & 621 .43 (.73)
Railway Age, No. 19, November 9, p. 595.
Santa Fe's new **Diesel** makes record run. (3 200 words and fig.)

1935 625 .123 (.73)
Railway Age, No. 19, November 9, p. 598.
Drying up the roadbed. — Extensive program of major drainage operations on the Pennsylvania. (5 200 words and fig.)

1935 656 .225 (.42) & 656 .261 (.42)
Railway Age, No. 19, November 9, p. 606.
LYNE (J.-G.). — **British Railways attain high efficiency in L. c. l. handling.** (3 500 words and fig.)

1935 625 .13 (.73) & 693 (.73)
Railway Age, No. 20, November 16, p. 626.
Denver & Salt Lake lines Moffat Tunnel with **concrete.** (4 300 words and fig.)

1935 656 .23 (.73)
Railway Age, No. 20, November 16, p. 635.
BATTLE (J. D.). — **The coal industry and the railroads.** (2 600 words.)

1935 **621 .43 (.73)**
Railway Age, No. 20, November 16, p. 637.
WILSON (J.-R.). — Boston & Maine **railcar** equipped with supercharged Diesel engine. (2 200 words and fig.)

1935 **624 (0**
Railway Age, No. 21, November 23, p. 658.
WEBB (C.-E.). — Many influences affect trend of **bridge design and construction.** (4 200 words and fig.)

1935 **621 .335 (.73) & 621 .43 (.73)**
Railway Age, No. 21, November 23, p. 662.
BEARCE (W.-D.). — **Electric drive** for Diesel motive power. (1 200 words and fig.)

1935 **621 .392 (.73) & 625 .211 (.73)**
Railway Age, No. 21, November 23, p. 664.
Welded underframes on Lehigh Valley cars. (600 words and fig.)

1935 **385 (.73)**
Railway Age, No. 21, November 23, p. 665.
BUDD (R.). — **Merge railways into 20 systems.** (4 500 words.)

1935 **656 .1 (.73)**
Railway Age, No. 21, November 23, p. 670.
Missouri Pacific establishes new Western routes. (1 900 words and fig.)

1935 **656 .1 (.73)**
Railway Age, No. 21, November 23, p. 673.
Short line turns to **rail-highway operation.** (2 000 words, 1 table and fig.)

1935 **656 .23 (.71)**
Railway Age, No. 21, November 23, p. 675.
Canadian Pacific wins back traffic. (1 700 words and fig.)

1935 **656 .1 (.73) & 656 .261 (.73)**
Railway Age, No. 21, November 23, p. 677.
TURNEY (J.-R.). — **Railway and truck,** co-partners. (3 500 words.)

Railway Engineering and Maintenance. (Chicago.)

1935 **621 .392 (.73) & 625 .143.4 (.73)**
Railway Engineering and Maintenance, November, p. 656.
St. Louis-San Francisco combines joint-bar with **rail-end welding.** (3 000 words and fig.)

1935 **625 .1 (06 (.73)**
Railway Engineering and Maintenance, November, p. 660.
Bridge and Building Officers discuss problems of the day. Reports on : Cleaning steel bridges. — Underwater inspection and examination of railroad structures. — Relative merits of different types of pumps. — The welding of pipes. — Inspection of bridges and buildings in the light of today's deferred maintenance. — The use of treated timber in buildings. — Types of floor for highway bridges. (25 000 words and fig.)

Railway Gazette. (London.)

1935 **621 .138.5 (.66) & 625 .26 (.6**
Railway Gazette, No. 19, November 8, p. 776.
SELLS (M.-P.). — **The locomotive, carriage and w gon workshops of the Nigerian Railway.** Part II. The locomotive group, its sub-division, layout, mac nes, and general description. (1 800 words and fi

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1935 **656 .261 (.4**
Railway Gazette, No. 19, November 8, p. 785.
New **depot for Pickfords suburban goods service** Willow Walk in South London. (1 000 words and fi

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1935 **621 .134.1 (.42) & 621 .138.5 (.4**
Railway Gazette, No. 20, November 15, p. 824.
The repair of locomotive connecting rods. II. I tails of the progressive system in use at the Horw works, L. M. S. Ry. (1 000 words and fig.)

1935 **621 .132.3 (.6**
Railway Gazette, No. 20, November 15, p. 827.
New Pacific locomotives for South Africa. (2 words and fig.)

1935 **621 .138.5 (.4**
Railway Gazette, No. 20, November 15, p. 832.
Recent developments at Inchicore locomotive wor Great Southern Railways, Ireland. (900 words fig.)

1935 **621 .132.3 (.4**
Railway Gazette, No. 20, November 15, p. 835.
The « British Legion » engine, L. M. S. Ry. words and fig.)

1935 **656 .251 (.4**
Railway Gazette, No. 21, November 22, p. 867.
Changing the signals in France. (1 100 words fig.)

1935 **621 .392 (.42) & 625 .232 (.4**
Railway Gazette, No. 21, November 22, p. 869.
New first class sleeping cars, L. M. S. Ry. (2 words and fig.)

1935 **621 .43 & 625 .**
Railway Gazette, No. 21, November 22, p. 876.
New petrol-driven rail and inspection cars for o seas service. (1 200 words and fig.)

1935 **625 .245 (.**
Railway Gazette, No. 21, November 22, p. 879.
British freight rolling stock. — IV. — G. W. types for special classes of traffic. (Fig.)

1935 **656 .25 (.4**
Railway Gazette, No. 22, November 29, p. 909.
Electric signalling at Tofta, Sweden. (400 wo and fig.)

1935 **625 .215 (.**
Railway Gazette, No. 22, November 29, p. 910.
The Timmis bogie. (1 200 words and fig.)

35 621 .132.3 (.44)
ay Gazette, No. 22, November 29, p. 912.
narkable results from the latest **French rebuilt ic and 4-8-0 engines.** (2 700 words and fig.)

35 621 .138.5 (.66) & 625 .26 (.66)
ay Gazette, No. 22, November 29, p. 918.
LLS (M.-P.). — **The locomotive carriage and wa- workshops of the Nigerian Railway.** (Continued.)) words and fig.)

35 385 & 608
ay Gazette, No. 22, November 29, p. 927.
e influence of invention on railway department. 0 words.)

35 621 .43 (.460)
l Railway Traction, p. 938, Supplt. to the Ry. Gazette, November 29.
g developments in diesel traction on the Northern ay of Spain. (1 200 words and fig.)

35 621 .43
l Railway Traction, p. 940, Supplt. to the Ry. Gazette, November 29.
IRBURN (C.-E.). — **The application of the Diesel ie to railway work.** (4 300 words and fig.)

35 621 .43 (.44)
l Railway Traction, p. 944, Supplt. to the Ry. Gazette, November 29.
00 b. h. p. Diesel mechanical trains for France. 0 words and fig.)

35 621 .43 (.42)
l Railway Traction, p. 946, Supplt. to the Ry. Gazette, November 29.
e Great Western Railway extends its **diesel ser-** (1 400 words and fig.)

35 621 .43 (.44)
l Railway Traction, p. 950, Supplt. to the Ry. Gazette, November 29.
cylinder engines for P. L. M. diesel electric rail- (1 000 words and fig.)

35 385 .113 (.41) & 621 .43 (.41)
l Railway Traction, p. 952, Supplt. to the Ry. Gazette, November 29.
ilcar results in Ireland. (800 words and fig.)

35 621 .331 (.42)
ric Ry. Traction, p. 851, Supplt. to the Ry. Gazette, November 15.
NN (A.-L.). — **The London Underground Rail- s.** (3 000 words and fig.)

35 621 .338 (.492)
ric Ry. Traction, p. 855, Supplt. to the Ry. Gazette, November 15.
ticulated trains in Holland. (500 words and fig.)

Railway Magazine. (London.)

1935 **385 (091 (.63)**
Railway Magazine, December, p. 391.
The Abyssinian Railway. (1 500 words and fig.)

1935 **656 .222.1 (.42)**
Railway Magazine, December, p. 401.
ALLEN (C.-J.). — **British locomotive practice and performance.** (4 200 words, tables and fig.)

1935 **385 (09 (.43)**
Railway Magazine, December, p. 423.
ELLIS (C.-H.). — **The German Railways** 1835-1935 (Part II). (2 700 words and fig.)

Railway Mechanical Engineer. (Philadelphia.)

1935 **621 .43 & 621 .8**
Railway Mechanical Engineer, November, p. 451.
LIPETZ (A.-I.). — **Diesel engines and transmissions** for railroad service. (4 400 words and fig.)

1935 **621 .139 (.73) & 625 .27 (.73)**
Railway Mechanical Engineer, November, p. 456.
Equipment dismantling plant for Chicago, Milwaukee, St. Paul and Pacific. (3 000 words and fig.)

1935 **621 .132.5 (.47)**
Railway Mechanical Engineer, November, p. 460.
BABENKO (D.). — **Non-articulated 4-14-4 type** locomotive built in Russia. (2 600 words, 1 table and fig.)

1935 **621 .135.2 (.73)**
Railway Mechanical Engineer, November, p. 463.
Burlington applies **Timken driving boxes.** (1 500 words and fig.)

1935 **625 .235**
Railway Mechanical Engineer, November, p. 470.
JOHNSEN (A.-M.). — **Painting railway passenger cars.** (1 700 words and fig.)

1935 **625 .214**
Railway Mechanical Engineer, November, p. 471.
Journal bearing protector. (300 words and fig.)

1935 **621 .9 (.73)**
Railway Mechanical Engineer, November, p. 472.
Manufacturing grain doors. (1 300 words and fig.)

Railway Signaling. (Chicago.)

1935 **656 .25 (0**
Railway Signaling, November, p. 571.
SHEETS (R. A.). — **Stopping distance and signal spacing.** (1 000 words and fig.)

1935 **656 .256.3 (.73)**
Railway Signaling, November, p. 573.
NOBLE (S. E.). — **New signaling on the route of** the Chicago and North Western. — « 400 ». (5 000 words and fig.)

1935 **625 .151 (.73) & 656 .258 (.73)**
Railway Signaling, November, p. 581.
Spring switch replaces mechanical interlocking. (1 600 words and fig.)

1935 **656 .258 (.73)**
Railway Signaling, November, p. 582.
Combination of interlockings on the Boston and Maine. (1 900 words and fig.)

1935 **656 .258 (.73)**
Railway Signaling, November, p. 587.
Automatic interlocking on the Texas and New Orleans. (850 words and fig.)

1935 **621 .392 & 656 .25**
Railway Signaling, November, p. 589.
TIZZARD (T.-W., Jr.). — **Portable A.-C. — D.-C. test set.** (1 200 words and fig.)

1935 **625 .162 & 656 .259**
Railway Signaling, November, p. 590.
WILLIAMS (C.-A.). — **Standardization of circuit plans for highway crossing signals.** (1 400 words and fig.)

South African Railways and Harbours Magazine. (Johannesburg.)

1935 **621 .131.1 (.68)**
South African Railways and Harbours Magazine, November, p. 1359.
Mechanical Department's Activities. — **Locomotive conversions** on the South African Railways. (900 words and fig.)

The Locomotive. (London.)

1935 **621 .133.4**
The Locomotive, November 15, p. 337.
Emission of smoke. (1 000 words.)

1935 **621 .33 (.493)**
The Locomotive, November 15, p. 341.
The electric railway between Brussels and Antwerp. (800 words and fig.)

1935 **621 .43 (.485)**
The Locomotive, November 15, p. 343.
A new type Diesel-electric car for Sweden. (900 words and fig.)

1935 **621 .132.7 (.43)**
The Locomotive, November 15, p. 344.
0-6-0 tank locomotive, German National Railways. (600 words and fig.)

1935 **621 .43 (.4**
The Locomotive, November 15, p. 345.
Twin oil-engined railcar chassis for the G. W. R (1100 words and fig.)

1935 **621 .13 (06 (.42) & 621 .135.2 (.4**
The Locomotive, November 15, p. 347.
Locomotive wheels, tyres and axles. — Paper pr sented at the Institution of Locomotive Engineer October 31, 1935, by Mr. E. S. COX. (4 500 words.)

1935 **625 .6**
The Locomotive, November 15, p. 355.
C-10-0 locomotive for the Lithuanian Railways. (9 words and fig.)

1935 **621 .134**
The Locomotive, November 15, p. 357.
Recent Continental developments of the **Lentz poj pet valve gear.** (1 200 words and fig.)

1935 **621 .43 & 621**
The Locomotive, November 15, p. 359.
KOFFMANN (T.-L.). — **Railcar transmission.** (1 5 words and fig.)

1935 **621 .133**
The Locomotive, November 15, p. 363.
Treatment of feed water for locomotives. (1 4 words and 1 table.)

Transit Journal. (New York.)

1935 **388 (.4**
Transit Journal, November, p. 408.
KLAPPER (C.-F.). — **World's largest transit syster** (2 500 words and fig.)

In Spanish.

Anales de la Asociación de Antiguos Alumnos del I. C. A. I. (Madrid.)

1935 **621 .3**
Anales de la Asociación de Antiguos Alumnos d I. C. A. I., octubre, p. 507.
ECHEVARRIA REZOLA (R. de). — Notas sob **soldadura eléctrica** como elemento de construcció (Soldadura del acero laminado y forjado.) (4 300 p labras & fig.) (Continuará.)

Ferrocarriles y Tranvías. (Madrid.)

1935 **621 .43 (.48**
Ferrocarriles y Tranvías, noviembre, p. 318
El primer **servicio de viajeros** realizado complet mente **con automotores Diesel.** (3 400 palabras & fig

1935 **621 .**
Ferrocarriles y Tranvías, noviembre, p. 328.
Aspectos económicos y financieros de la explotaci de **automotores** franceses. (1 100 palabras.)

Hormigón y Acero. (Madrid).

935 **62. (01 & 691**

nigón y Acero, noviembre, p. 471.

AMPUS (F.). — Esfuerzos producidos en el hor-n a consecuencia de las variaciones de volumen. 0 palabras & fig.) (Continuará.)

Ingeniería y Construcción. (Madrid.)

935 **621 .33 (.3)**

niería y Construcción, diciembre, p. 728.

BERT Y SALINAS (A.). — Notas sobre elec-caciones ferroviarias (11 000 palabras & fig.)

935 **385 .1 (.460)**

niería y Construcción, diciembre, p. 781.

OPEZ JAMAR (L.). — Efecto de la crisis general e los ferrocarriles españoles. (1 000 palabras &

Revista de Ingeniería Industrial. (Madrid.)

935 **621 .33 (.460)**

sta de Ingeniería industrial, noviembre, p. 376.

ANI (M.). — La electrificación de nuestros ferro-les. (5 400 palabras & fig.)

Revista de Obras Públicas. (Madrid.)

935 **624 .63 (.460)**

sta de Obras Públicas, N° 23, 1° de diciembre, p. 442.

IDALGO (A.) & GONZALEZ (J.-J.). — El nuevo te de los Viveros sobre el río Manzanares de Ma- (1 800 palabras & fig.)

In Italian.

Annali dei lavori pubblici. (Roma.)

935 **624 .61 (.45)**

ali dei lavori pubblici, giugno, p. 450.

IOZZI (E.). — Dal ponte di Rialto al nuovo ponte i Scalzi. (7 000 parole & fig.) (Continua.)

935 **624 (.45) & 656 .1 (.45)**

ali dei lavori pubblici, ottobre, p. 833.

NI (G.). — L'autocamionale Genova-Valle del Po. 00 parole, 29 tavole & fig.)

L'Ingegnere. (Roma.)

935 **624 .2**

gegnere, dicembre, p. 903.

ASI (F.). — Strutture inflesse incastrate a travi tenti a torsione. (1 500 parole & fig.)

935 **385. (09 (.55)**

gegnere, dicembre, p. 909.

ARDI (P.-M.). — La ferrovia Transiriana. (3 500 le & fig.)

In Dutch.

De Ingenieur. (Den Haag.)

1935 **656 .211 & 656 .222**

De Ingenieur, Nr. 48, 29 November, p. V. 69.

VAN WYCK (H.-P.-D.). — De samenhang tusschen den aanleg van personenstations en den treinenloop. (6 300 woorden & fig.)

1935 **656 .225 (.492)**

De Ingenieur, Nr. 49, 6 December, p. V. 77.

ENTE (J.). — Stukgoederenvervoer bij de Nederlandsche Spoorwegen. (10 000 woorden & fig.)

1935 **721 .1**

De Ingenieur, Nr. 50, 13 December, p. B. 239.

TERZAGHI (K. von). — Die Setzung der Fundierungen und ihre Wirkung auf den Oberbau. (11 000 woorden & fig.)

Spoor- en Tramwegen. (Utrecht.)

1935 **625 .154**

Spoor en Tramwegen, Nr. 25, 3 December, p. 591.

MAAS GEESTERANUS. — Mechanische beweging van locomotief-draaischijven. (2 000 woorden & fig.)

In Portuguese.

Gazeta dos caminhos de ferro. (Lisboa).

1935 **625 .4**

Gazeta dos caminhos de ferro, N° 1151, 1. de dezembro, p. 487.

DE SOUZA (J.-F.). — Novo sistema de linha férrea aérea o railplano. (1 000 palavras & fig.)

In Polish.

(= 91.885)

Inżynier Kolejowy. (Warszawa).

1935 **624 .2 = 91 .885**

Inzynier Kolejowy, No. 9/133, p. 254.

DOBRZYJALOWSKI (A.). — Formulæ for the calculation of stresses in cantilever frames. (3 000 words, 3 tables and fig.)

1935 **621 .133.1 = 91 .885**

Inzynier Kolejowy, No. 9/133, p. 260.

MADEYSKI (J.). — Recent solution of the locomotive coal-firing problem. (2 100 words and fig.)

1935 **621 .392 = 91 .885**
& 625 .143.4 = 91 .885

Inzynier Kolejowy, No. 10/134, p. 283.

SZELAGOWSKI (F.). — Buckling of **welded rails.** (2 000 words and fig.)

1935 **625 .14 (01 = 91 .885**

Inzynier Kolejowy, No. 10/134, p. 287.

MIECZYSLAW BESSAGA. — Maximum admissible **track loads.** (1 800 words, 6 tables and fig.)

1935 **656 .222 = 91 .885**

Inzynier Kolejowy, No. 10/134, p. 292.

KROCZEWSKI (A.). — Simplified method of calculating **train timings** by means of monographs. (1 500 words and fig.)

1935 **385. (06.4 (.493) = 91 .**

Inzynier Kolejowy, No. 10/134, p. 297.

WASILEWSKI (S.). — The Brussels Universal International **Exhibition.** (7 000 words and fig.)

1935 **621 .33 (.44 + .485) = 91 .**

Inzynier Kolejowy, No. 11/135, p. 311.

PARENSKI (A.). — Importance from the econo point of view and development of **railway electr cation** in France and Sweden. (5 500 words, 3 m and 4 tables.)

1935 **621 .43 = 91 .**

Inzynier Kolejowy, No. 11/135, p. 328.

RUDOWSKI (K.). — New double-acting **Diesel gine.** (1 800 words and fig.)

M. Weissenbruch Co., Ltd., Printer of the King, 49, rue du Poinçon, Bruxelles.

MONTHLY BIBLIOGRAPHY OF RAILWAYS [1].

PUBLISHED UNDER THE SUPERVISION OF

P. GHILAIN,

General Secretary of the Permanent Commission of the International Railway Congress Association.

(MARCH 1936)

016. 385. (02]

I. — BOOKS.

In French.

36 624 .92

HTERGAL (A.).

arpentes métalliques : calcul et construction.

cle (Belgique), Nachtergal, 23, rue Alphonse As-rgs. 1 volume, 684 pages, 975 figures et 37 plan-

36 531

ONI (A.).

Équilibrage et les machines à équilibrer.

ris, Dunod. 1 volume, 172 pages et 78 figures. : 34 fr. français.)

36 621 .33

ODI (H.) & TETREL.

s études d'électrification. La traction électrique et emin de fer.

ris, Dunod. 1 volume (16 × 25), 558 pages, 210 es et 3 planches. (Prix : 148 fr. français.)

In German.

935 621 .131.1 & 621 .133.1

SEN (W.).

e Verbesserung der Wirtschaftlichkeit der Dampf-motive durch konstruktive Massnahmen zur Sen-g des Brennstoffverbrauchs.

rlin, Julius Springer. 1 Band, 104 Seiten und Ab-ngen.

935 656

ATH (C.).

onjunktur und Luftverkehr.

rlin, Verkehrswissenschaftliche Lehrmittelgesell-ft. m. b. H. bei der Deutschen Reichsbahn. 1 Band, eiten und Abbildungen.

935 656 .1 (.43)

K (F.).

er Aufbau der Gesellschaft « Reichsautobahnen ».

ipzig, Konkordia-Verlag. 1 Band, 63 Seiten mit ildungen. (Preis : 2 R.M.)

1936 621 .392

MELLER (K.).

Taschenbuch für die Lichtbogenschweissung.

Leipzig, Hirzel, S. 1 Band, 189 Seiten mit 83 Abbildungen. (Preis : 5 R.M.)

1935 621 .116

WESCHE (H.).

Die Brennstoffe.

Stuttgart-W., Ferdinand Enke. 1 Band, 148 Seiten (14 × 22), 46 Zahlentafeln und 108 Abbildungen. (Preis : 11 R.M.)

1935 385. (09 (.43)

« HUNDERT JAHRE DEUTSCHE EISENBAHNEN. »

Berlin, Verkehrswissenschaftliche Lehrmittelgesellschaft m. b. H. bei der Deutschen Reichsbahn. 1 Band.

1935 625. (02

Elsners Taschenbuch für den bautechnischen Eisenbahndienst.

Berlin, Otto Elsner, Verlagsgesellschaft. 1 Band.

In English.

1935 721 .1

ALLIN (R. V.).

The resistance of piles to penetration, together with tables of approximate values based on the Hiley formula.

London. E. and F. N. Spon, Ltd. (Price : 10 sh. 6 d. net.)

1935 621 .43

ANDERSON (J. W.).

Diesel engines.

New York and London. McGraw-Hill Book Co. (6 × 9 inches), 491 pages, illust., diagrams, charts, tables. (Price : $ 5.00.)

1935 662

DEPARTMENT OF SCIENTIFIC AND INDUSTRIAL RESEARCH.

Report of the Fuel Research Board for the year ended 31st March 1935, with report of the Director of Fuel Research.

London. H. M. Stationery Office. (Price : 3 sh. 6 d. net.)

(1) The numbers placed over the title of each book are those of the decimal classification proposed by the Railway Congress jointly with the Office Bibliographique International, of Brussels. (See « Bibliographical Decimal Classification as applied to lway Science », by L. WEISSENBRUCH, in the number for November 1897, of the *Bulletin of the International Railway Congress*, 1509).

1935 **62. (01**

GIBBONS (C. H.).

Materials testing machines.

Pittsburgh (U.S.A.). Instruments Publishing Co. (5 × 8 inches), 89 pages, illust., tables. (Price : $ 2.00.)

1935 **621 .43**

JUDGE (Arthur W.).

High-speed diesel engines, with special reference to automobile and aircraft types. An elementary text-book for Engineers, students and operators.

London. Chapman and Hall, Ltd. Second edition, revised and enlarged. (Price : 15 sh. net.)

1935 **38 & 656**

LOCKLIN (D. Philip).

Economics of transportation.

Chicago, Ill. The Business Publications, Inc. (6 × 9 inches), 788 pages, numerous maps and charts. (Price : $ 4.00.)

1935 **38 & 656**

LONG (W. Rodney).

Railway and higway transportation abroad. A study of existing relationships, recent competitive measures and coordination policies.

Washington, D. C. For sale by the Superintendent of Documents. (6 × 9 inches), 426 pages. (Price : 50 cents.)

1935 **691**

Mac LEAN (J. D.).

Manual on preservative treatment of wood by pressure.

Washington, D. C. For sale by Superintendent of Documents. (6 × 9 inches), 124 pages, diagrams, formulas. (Price : 15 cents.)

1935 **38**

PAVER (John) & McCLINTOCK (Miller).

Traffic and trade. An introduction to the analysis of the relationship between the daily habitual movement of people and their trade activities in markets.

New York and London. McGraw-Hill Book Co. (9 × 12 inches), 137 pages, numerous maps and charts. (Price : $ 4.50.)

1935 **621 .31**

RISSIK (H.).

Mercury arc current converters.

London. Sir Isaac Pitman and Sons, Ltd. (Price : 21 sh.)

1935 **347 .763 (.73) & 656 .1 (**

State restrictions on motor vehicle sizes weights.

Washington, D. C. Published by National High Users Conference, National Press Building. (8 1/2 11 inches), 120 pages, principally diagrams. (Pr $ 1.00.)

1935 **621 .392 & 669 .1**

THE IRON AND STEEL INSTITUTE.

Symposium on the welding of iron and steel. Vo Present day practice and problems of welding in engineering industries. Vol. II. Welding practice technique, including welding apparatus. The me lurgy of welding. Specification, Inspection, Tes and safety aspects of welding.

London. Offices of the Institute. (Price : 2 lumes, £ 1-10-0 to members; £ 2-2-0 to non-membe

In Spanish.

1935 **313 .385 (.4**

SERVICIO DE ESTADISTICA.

Estados números 1 al 4.

Estado nº 1. — **Clasificación y situación de compañías de ferrocarriles en 31 de diciembre de 1**

Estado nº 2. — **Resultados de la explotación (1 34).**

Estado nº 3. — **Cargas financieras y divide (1920-34).**

Estado nº 4. — **Impuesto de todas clases percib por el Estado (1920-34).**

Madrid, Asociación General de transportes por férrea. 1 volumen, 62 páginas y figuras.

In Italian.

1936 **72**

SANTARELLA (L.).

La tecnica delle fondazioni.

Milan, Hoepli. 1 volume, 352 pagine e 357 fig (Prezzo : 40 lire.)

1935 **624 .1 & 72**

SANTARELLA (L.).

La tecnica delle fondazioni con particolare rigu alla costruzione dei ponti e delle grandi strutture.

Bologna, L. Cappelli. 1 volume, 349 pagine e fig (Prezzo : Lire 40.)

016. 385. (05]

II. — PERIODICALS.

In French.

Annales des Ponts et Chaussées (Paris).

935 **621 .33 (.44)**

ıales des ponts et chaussées, octobre, p. 561.

)ELATTRE (P.). — Note sur l'électrification d'un mier tronçon du chemin de fer de la Mure à Gap et la nouvelle alimentation en énergie électrique du min de fer de St.-Georges-de-Commiers à La Mure. 00 mots & fig.)

---

935 **624 (.493)**

ıales des ponts et chaussées, octobre, p. 603.

)ESPRETS (R.). — Note sur la construction des ts « Vierendeel » pour chemins de fer à voie nor- e. (9 000 mots & fig.)

Annales des travaux publics de Belgique. (Bruxelles.)

935 **313 : 656 (.493)**

ı. des travaux publics de Belgique, décembre, p. 871.

)E LEENER (G.). — La **statistique des transports** Belgique. (7 200 mots.)

Arts et Métiers. (Paris.)

935 **62. (01**

s et Métiers, décembre, p. 263.

OBIN (M.). — Le cercle de Mohr et la limite de istance des matériaux. Formules de résistances com- ées. (2 400 mots & fig.)

---

935 **669 .1**

s et Métiers, décembre, p. 269.

OVET (L.). — Note sur **les aciers et les fontes** r pièces en service à haute température. (4 500 ts & fig.)

Bulletin de la Société d'encouragement pour l'industrie nationale. (Paris.)

935 **669**

l. de la Soc. d'encouragement pour l'ind. nat., oc- tobre-novembre, p. 561.

IRARDET (L.-F.). — Progrès réalisés dans l'éla- ation des **fontes** de qualité et la fabrication des ulages résistants. (3 000 mots & fig.)

Bulletin de la Société des ingénieurs civils de France. (Paris.)

1935 **625 .5 (.44)**

Bull. de la Soc. des ing. civ. de France, juillet-août, p. 435.

BACQUEYRISSE (M.-L.). — Le nouveau **funiculaire** de Montmartre. (3 800 mots & fig.)

1935 **691**

Bull. de la Soc. des ing. civ. de France, juillet-août, p. 529.

LONDAIS (R.). — **Bétonnières automatiques** — pompes à béton. (4 500 mots & fig.)

Bulletin de l'Union internationale des chemins de fer. (Paris.)

1935 **385 .61 (.4)**

Bull. de l'Union intern. des ch. de fer, novembre-décembre, p. 421.

Unité technique des chemins de fer. Projet de rédaction établi par l'U. I. C. (1935). (20 000 mots & fig.)

1936 **656 .234**

Bull. de l'Union intern. des ch. de fer, janvier, p. 1.

LANDRA (A.). — L'unification des droits internes qui régissent les **transports de voyageurs** par chemins de fer. (11 700 mots.)

1936 **385 .113 (.493)**

Bull. de l'Union intern. des ch. de fer, janvier, p. 14.

La **Société Nationale des chemins de fer belges** en 1934. (4 400 mots.)

1936 **656 .231 (.44)**

Bull. de l'Union intern. des ch. de fer, janvier, p. 19.

La nouvelle **tarification** des grands réseaux de chemins de fer français. (2 900 mots.)

Bulletin des transports internationaux par chemins de fer. (Berne.)

1935 **656 .235.6**

Bull. des transp. intern. par ch. de fer, décembre, p. 491.

MAIER (O.). — Le chemin de fer expéditeur est-il tenu de vérifier **l'itinéraire prescrit par l'expéditeur ?** (2 800 mots.)

1935 **385 .1 (.43)**

Bull. des transp. intern. par ch. de fer, décembre, p. 507.

Les **Chemins de fer du Reich** en 1934. (4 900 mots.)

1935 **313 .385 (.498)**
Bull. des transp. intern. par ch. de fer, décembre, p. 524.
Statistique des Chemins de fer roumains pour les années 1932, 1933 et 1934. (500 mots.)

Bulletin technique de la Suisse romande. (Vevey.)

1935 **656 .25**
Bull. techn. de la Suisse romande, 15 décembre, p. 1.
BANEUX (G.). — L'économie dans l'**éclairage des signaux.** III. Eclairage électrique. (2 000 mots & fig.)

1935 **625 .172**
Bull. techn. de la Suisse romande, 15 décembre, p. 9.
VANDENBERGHE (R.). — **Entretien des voies.** Augmentation du rendement. (700 mots & fig.)

1935 **625 .151**
Bull. techn. de la Suisse romande, 15 décembre, p. 11.
DE VOS (P.). — **Calcul des branchements.** (300 mots & fig.)

Génie civil. (Paris.)

1935 **62. (01 & 621 .43**
Génie civil, n° 2785, 28 décembre, p. 610.
Relations entre la fatigue et le tracé des organes des **moteurs Diesel.** (4 200 mots & fig.)

1935 **691 & 693**
Génie civil, n° 2785, 28 décembre, p. 614.
MARCOTTE (E.). — La perméabilité des **mortiers et bétons** et nouvelles recherches sur les hydrofuges. (Suite et fin.) (2 300 mots & 2 tableaux.)

1936 **656 .225 & 656 .26**
Génie civil, n° 2786, 4 janvier, p. 21.
Transports de marchandises « de porte à porte » au moyen de remorques automobiles placées sur des wagons plats. (800 mots & fig.)

1936 **62. (01 & 621 .392**
Génie civil, n° 2787, 18 janvier, p. 62.
DUTILLEUL (H.). — Etude de la **résistance à la fatigue des soudures** à franc-bord. (2 700 mots & fig.)

1936 **385 .44**
Génie civil, n° 2787, 18 janvier, p. 68.
L'évolution des **Chemins de fer français** au cours des dernières années. (2 300 mots.)

1936 **669 .1**
Génie civil, n° 2787, 18 janvier, p. 69.
La trempe superficielle des **fontes et aciers** par chauffage au chalumeau oxyacétylénique. (1 500 mots & fig.)

1936 **621 .43**
Génie civil, n° 2789, 25 janvier, p. 87.
Les nouveaux **moteurs Diesel-Krupp** avec injection directe, système Archaouloff. (1 900 mots & fig.)

1936 **385. (09 (.5**
Génie civil, n° 2789, 25 janvier, p. 95.
Les **chemins de fer** de la Birmanie. (700 mots & carte.)

L'Allègement dans les transports. (Lucerne.)

1936 **621**
L'Allègement dans les Transports, janvier-février, p.
PARODI (H.). — Observations sur les conditi d'établissement des **autorails à transmission électriq** (2 200 mots & fig.)

1936 **621 .43 (.4**
L'Allègement dans les Transports, janvier-février, p.
VANDERPUTTE (E.). — L'organisation des **ré sions des moteurs Diesel** des automotrices des chemi de fer belges. (1 900 mots & fig.) (A suivre.)

1936 **621.43 (.4**
L'Allègement dans les Transports, janvier-février, p.
JEANCARD (L.). — Les **autorails Diesel-électriqu** des Chemins de fer de la Provence. (1 000 mots & fi (A suivre.)

La Traction électrique. (Paris.)

1935 **621 .335 (.4**
La Traction Electrique, septembre-octobre, p. 87.
Locomotives Oerlikon 2-Do-2, nos E. 701 et 702 Chemin de fer de Paris à Orléans. (2 000 mots & fi

---

Le Container. (Paris.)

1935 **656 .225 & 656 .23**
Le Container, septembre, p. 2.
Transports en container. Dédouanement. (4 200 mot

1935 **656 .22 & 656 .2**
Le Container, septembre, p. 28.
Procédés techniques de **liaison route et rail.** (3 9 mots.)

L'Industrie des voies ferrées et des transpor automobiles. (Paris.)

1935 **621 .**
L'Ind. des voies ferrées et des transp. autom., n vembre, p. 291.
Les nouvelles **automotrices de Dietrich.** (1 700 mo & fig.)

L'Ingénieur-Constructeur. (Paris.)

1935 **625 .1**
L'Ingénieur-constructeur, novembre-décembre, p. 365
MALEGARIE (Ch.) & BIZE (J.). — Applicati **des raccordements progressifs** aux sinuosités des voi terrestres et fluviales. (1 700 mots.)

Revue générale des chemins de fer. (Paris.)

1936 **656 .234 (.44)**

vue générale des chemins de fer, janvier, p. 3.
BENITE (J.). — La **nouvelle tarification voyageurs** s grands réseaux français. (4 800 mots & fig.)

1936 **656 .211 (.44) & 725 .31 (.44)**

vue générale des chemins de fer, janvier, p. 14.
RIDET (J.). — **Nouvelles installations** de la gare de ims. (5 000 mots & fig.)

1936 **624 .3 (.489)**

vue générale des chemins de fer, janvier, p. 40.
Le **pont** sur le petit Belt. (2 000 mots & fig.)

1936 **625 .13 (.73)**

vue générale des chemins de fer, janvier, p. 45.
La construction du **Souterrain** de Baltimore. (2 700 ots & fig.)

Revue universelle des Mines. (Liége.)

1936 **62. (01 & 691**

vue universelle des mines, janvier, p. 3.
CAMPUS (F.). — **Tensions produites dans le béton le béton armé** par suite des variations de volume. 300 mots & fig.)

In German.

Die Lokomotive. (Wien.)

1935 **621 .132.3 (.73)**

e Lokomotive, Heft 12, Dezember, S. 217.
Die schwerste **Schnellzuglokomotive** der Welt. (900 örter und Abb.)

1935 **621 .132.3 (.493)**

e Lokomotive, Heft 12, Dezember, S. 219.
2 C1 4 Zylinder **Heissdampf-Schnellzuglokomotive** r Nationale Belgischen Eisenbahn-Gesellschaft. (1 000 örter und Abb.)

Elektrische Bahnen. (Berlin.)

1935 **621 .33 (.485)**

ektrische Bahnen, Dezember, S. 339.
HÄKANSSON (K.). — Die **Elektrisierung** der nwedischen Eisenbahnen. (2 700 Wörter und Abb.)

Glasers Annalen. (Berlin.)

1935 **621 .131.3 & 621 .132.3**

sers Annalen, Heft 11, 1. Dezember, S. 172.
NORDMANN (E.). — Neue **Versuche mit Schnellglokomotiven,** auch der Stromlinienform. (6 200 örter, 3 Zahlentafeln und Abb.)

1935 **621 .131.3 (.43)**

Glasers Annalen, Heft 11, 1. Dezember, S. 179; Heft 12, 15. Dezember, S. 191.
HARM. — Die **Schwingungsmesseinrichtung der Lokomotivversuchsabteilung** Grunewald. (9 900 Wörter und Abb.)

Organ für die Fortschritte des Eisenbahnwesens. (Berlin.)

1935 **385. (09.3 (.43)**

Organ für die Fortschritte des Eisenbahnwesens, Heft 24, 15. Dezember, S. 477.
Die Hauptdaten der technischen **Entwicklung der Deutschen Eisenbahnen.** (3 500 Wörter.)

1935 **621 .13 (09 (.43)**

Organ für die Fortschritte des Eisenbahnwesens, Heft 24, 15. Dezember, S. 486.
KLENSCH (C.). — Die **Lokomotive « Adler »** der ersten deutschen Eisenbahn und ihre Nachbildung im Reichsbahnausbesserungswerk Kaiserslantern. (3 800 Wörter und Abb.)

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Organ für die Fortschritte des Eisenbahnwesens, Heft 24, 15. Dezember, S. 492.
GUNZELMANN. — Die ersten deutschen **Eisenbahnwagen** und ihre Nachbildung. (3 300 Wörter und Abb.)

1935 **621 .13 (09**

Organ für die Fortschritte des Eisenbahnwesens, Heft 24, 15. Dezember, S. 500.
NORDMANN. — 100 Jahre **Lokomotivtheorie.** (3 500 Wörter.)

1935 **625 .23 (.43)**

Organ für die Fortschritte des Eisenbahnwesens, Heft 24, 15. Dezember, S. 503.
BORN (E.). — Zur **Entwicklung des Eisenbahnpersonenwagens** in Deutschland. (6 300 Wörter und Abb.)

1936 **656 .212.5**

Organ für die Fortschritte des Eisenbahnwesens, Heft 1, 1. Januar, S. 1.
RUSS. — Leistungsarten und Leistungsgrenzen der **Rangierbahnhöfe.** (15 000 Wörter, 12 Zahlentafeln und Abb.)

1936 **624 .32 (.489)**

Organ für die Fortschritte des Eisenbahnwesens, Heft 2, 15. Januar, S. 23.
FLENSBORG (H.). — Der Bau der **Brücke über den Kleinen Belt** und die Umgestaltung der anschliessenden Bahnanlagen. (11 000 Wörter und Abb.)

Zeitschrift des Vereines Deutscher Ingenieure. (Berlin.)

1935 **621 .116**

Zeitsch. des Ver. deutsch. Ing., Nr. 52, 28. Dezember, S. 1561.
RUTTMANN (W.). — Verformungslose **Brücke an Kesselteilen.** (3 600 Wörter und Abb.)

1936 **624 (.43)**

Zeitsch. des Ver. deutsch. Ing., Nr. 1, 4. Januar, S. 13.

SCHAPER (G.). — **Reichskraftfahrbahn-Brücken.** (3 900 Wörter und Abb.)

1936 **62. (01**

Zeitsch. des Ver. deutsch. Ing., Nr. 4, 25. Januar, S. 101.

CRUMBIEGEL (J.). — **Ermittlung von Drehspannungen aus Dehnungsmessungen.** (1 800 Wörter und Abb.)

Zeitschrift des Vereins Mitteleuropäischer Eisenbahnverwaltungen. (Berlin.)

1935 **385. (09 (.43)**

Zeitsch. des Ver. Mitteleurop. Eisenbahnverw., Nr. 51, 19. Dezember, S. 1074.

Hundert Jahre deutsche Eisenbahnen. (3 000 Wörter.)

1935 **656 .225 (.43) & 656 .235.7 (.43)**

Zeitsch. des Ver. Mitteleurop Eisenbahnverw., Nr. 52, 26. Dezember, S. 1085.

SOMMERLATTE. — **Verkehrsdienst. Beförderungsdienst und Landwirtschaft.** (6 000 Wörter und Abb.)

1936 **385. (09 (.43)**

Zeitsch. des Ver. Mitteleurop. Eisenbahnverw., Nr. 3, 16. Januar, S. 65.

SARTER (A.). — Die **Saarbahnen** als Bestandteil der Deutschen Reichsbahn. (3 200 Wörter und Abb.)

1936 **656 .251 (.43)**

Zeitsch. des Ver. Mitteleurop. Eisenbahnverw., Nr. 3, 16. Januar, S. 77.

Die Entwicklung des **Eisenbahnsignalwesens** in Deutschland. (3 700 Wörter.)

In English.

Journal, Institution of Engineers, Australia. (Sydney, N. S. W.)

1935 **721 .1**

Journal, Institution of Engineers, November, p. 390.

MULHOLLAND (J.). — **Bearing capacity of soils and their stress distribution.** (3 200 words.)

1935 **621 .43**

Journal, Institution of Engineers, November, p. 398.

LEASK (J. H.). — **Diesel-electric traction.** (5 700 words.)

Journal, Institute of Transport. (London.)

1935 **656 (.42)**

Journal, Institute of Transport, December, p. 98.

SHELMERDINE (Lt.-Col. F. C.). — **Air transport** in Great Britain. — Some problems and needs. (9 000 words.)

1935 **621 .13 (.42) & 621 .43 (.42**

Journal, Institute of Transport, December, p. 111.

FAIRBURN (C. E.). — The application of the **Diesel engine** to traction on passenger lines and in **shunting yards.** (24 000 words.)

Engineer. (London.)

1935 **721 .1 (.73**

Engineer, No. 4170, December 13, p. 615.

Sinking eight-foot rotary caissons in New York (3 200 words and fig.)

1935 **621 .**

Engineer, No. 4170, December 13, p. 617; No. 4171, December 20, p. 642; No. 4172, December 27, p. 66

BEALE (E. S. L.) & STANSFIELD (R.). — **The Standard-Sembury engine lubricator.** (12 500 words and fig.)

1935 **388 (.42**

Engineer, No. 4170, December 13, p. 619.

PICK (F.). — **The organisation of transport.** (Abstract of a paper read before the Royal Society of Arts on December 11th, 1935. (3 900 words.)

1935 **621 .33 (.42**

Engineer, No. 4170, December 13, p. 623.

Railway Directors and **electrification.** (1 300 words

1935 **621 .**

Engineer, No. 4170, December 13, p. 626.

GIFFEN (E.). — Extended expansion in **internal combustion engines.** (4 500 words and fig.)

1935 **621 .43 (.71) & 621 .8 (.7**

Engineer, No. 4171, December 20, p. 638.

Report on test of **1 400 h.p. epicyclic test gear** (2 000 words and fig.)

1935 **6**

Engineer, No. 4171, December 20, p. 640.

SMITH (Sir Frank E.). — **Coal, power and smoke** (6 000 words.)

1935 **62. (01 & 6**

Engineer, No. 4171, December 20, p. 657.

A method of determining the **strength of weld metal within a welded joint.** (1 200 words and fig.)

1935 **621 .43 (.8**

Engineer, No. 4172, December 27, p. 671.

All-metal **140 h.p. oil-electric railcar** for the Argentine. (2 200 words and fig.)

1935 **625 .616 (.8**

Engineer, No. 4172, December 27, p. 681.

Two **metre-gauge locomotives.** (800 words and fig

935 **621 .33 (.42) & 625 .4 (.42)**
ineer, No. 4172, December 27, p. 682.
RUCE (W. R.). — **Electrification** of the Glasgow rict subway. (5 200 words and fig.)

935 **669 .1**
Metallurgist, p. 82, Supplt. to the Engineer, December 27.
ie scaling of iron and steel. (8 900 words.)

935 **669 .1**
Metallurgist, p. 85, Supplt. to the Engineer, December 27.
ie iron-tantalum diagram. (700 words and fig.)

935 **62. (01 & 669 .1**
Metallurgist, p. 86, Supplt. to the Engineer, December 27.
URNS (G.). — **Notched bar impact tests.** (1 200 ds and fig.)

935 **669 .1**
Metallurgist, p. 88, Supplt. to the Engineer, December 27.
uminium in modern commercial steels. (1 700 ds and fig.)

Engineering. (London.)

35 **721 .1**
neering, No. 3648, December 13, p. 642; No. 3649, December 20, p. 655.
AVENOR (M. A.). — The determination of **foundn pressures on clay.** (3 700 words and fig.)

35 **62. (01**
neering, No. 3648, December 13, p. 647.
AILEY (R. W.). — The utilisation of **creep-test** in engineering design. (Paper read before the tution of Mechanical Engineers, November 22, Abridged.) (4 900 words, 7 tables and fig.)

35 **385. (072 (.42)**
neering, No. 3649, December 20, p. 661.
M. S. Railway **research laboratory** at Derby (7 500 s and fig.)

35 **621**
neering, No. 3649, December 20, p. 671, 675; No. 3649, December 27, p. 702.
ANNON (J.). — **Damping influences in torl oscillation.** (Paper read at the Institution of anical Engineers, December 13, 1935. Abridged.) 0 words.)

35 **62. (01 & 669**
neering, No. 3649, December 20, p. 673; No. 3650, December 27, p. 699.
NKINS (C. H. M.) & MELLOR (G. A.). — Ingation of the **behaviour of metals under deform- at high temperatures.** — Part. I. — Structural changes in mild steel and commercial irons during creep. (Communication from the National Physical Laboratory read before the Iron and Steel Institute, at Manchester, September 18, 1935. Abridged.) (7 600 words and fig.)

1935 **621 .33 (.494) & 656 .222 (.494)**
Engineering, N°. 3650, December 27, p. 686.
Express railway services in Switzerland. (450 words.)

1935 **621 .43 (.82)**
Engineering, No. 3650, December 27, p. 688.
All-metal railcar for the Argentine. (1 400 words and fig.)

Engineering News-Record. (New York.)

1935 **624 (.73)**
Engineering News-Record, No. 21, November 21, p. 702.
LAMB (G. W.). — **Continuous spans** favored for Kansas highways. (2 400 words and fig.)

1935 **721 .7 (.73)**
Engineering News-Record, No. 21, November 21, p. 709.
DOUGHERTY (D. A.). — Cost of two types of **floor construction** compared. (400 words and fig.)

1935 **721 .1**
Engineering News-Record, No. 22, November 28, p. 746.
CONVERSE (F. J.). — Settlement **of footings** in alluvial soil. (1 000 words and fig.)

1935 **625 .13 (.73)**
Engineering News-Record, No. 23, December 5, p. 772.
EMERY (P.). — **Guy derricks lift railway spans back onto piers after flood.** (600 words and fig.)

1935 **625 .13 (.73)**
Engineering News-Record, No. 23, December 5, p. 774.
Ingenious **relining** procedure in a traffic-burdened **tunnel.** (3 900 words and fig.)

1935 **624 .2**
Engineering News-Record, No. 24, December 12, p. 814.
ENEY (W. J.). — **Fixed-end moments by cardboard models.** (1 500 words and fig.)

Mechanical Engineering. (New York.)

1935 **621**
Mechanical Engineering, December, p. 772.
FULLMER (I. H.). — **Fundamentals of mechanical dimensional control.** (9 600 words and fig.)

Modern Transport. (London.)

1935 **621 .43 (.436)**
Modern Transport, No. 873, December 7, p. 3.
KARNER (E.). — **Diesel-electric railcars** in Austria. A new high-speed unit. (1 300 words and fig.)

1935 **621 .33 (.42) & 625 .4 (.42)**

Modern Transport, No. 873, December 7, p. 5.

BRUCE (W. R.). — **Glasgow district subway electrification** of a cable system. (2 500 words.)

1935 **656 .25**

Modern Transport, No. 873, December 7, p. 7.

PETER (L. H.). — **Development in railway signalling.** — Electrical interlocking. — Code control. — Train description. (2 000 words and fig.)

1935 **656 .1 (.42)**

Modern Transport, No. 874, December 14, p. 3.

RICHARDSON (A. W. C.). — **Passenger services by road.** (2 100 words.)

1935 **625 .116 (.81)**

Modern Transport, No. 874, December 14, p. 4.

British-built locomotives for South America. — **Metre-gauge units** for Sao Paulo Parana Railway. (700 words and fig.)

1935 **385 (072 (.42)**

Modern Transport, No. 874, December 14, p. 5.

Scientific research on the L. M. S. Ry. (1 900 words and fig.)

1935 **625 .13 (.42)**

Modern Transport, No. 874, December 14, p. 6.

Ventilation of Mersey tunnel. — An interesting remote control system. (1 200 words and fig.)

1935 **656 .261 (.42)**

Modern Transport, No. 875, December 21, p. 3.

Parcels distribution in Surrey. (1 200 words and fig.)

1935 **656 .261**

Modern Transport, No. 875, December 21, p. 4.

Railway cartage. — Scope for motor manufacturers. (1 600 words.)

1935 **621 .43 (.82)**

Modern Transport, No. 875, December 21, p. 7.

Diesel-electric railcars for the Argentine. — Streamlined all-metal units for luxury services. (2 000 words and fig.)

1935 **388 (.42)**

Modern Transport, No. 875, December 21, p. 8.

PICK (F.). — **Transport in Greater London.** — Organisation and planning. (2 400 words.)

Railway Age. (New York.)

1935 **656 .23 (.73)**

Railway Age, No. 22, November 30, p. 692.

Reduced rates continue to attract passenger business (U. S. A.). (4 300 words and fig.)

1935 **656 .23 (.73) & 659 (.**

Railway Age, No. 22, November 30, p. 696.

Merchandising passenger service increases reven — Modern sales methods, where adopted, demonstr their merit in developing business. (5 000 words fig.)

1935 **656 .222.1 (.73) & 656 .23 (.**

Railway Age, No. 22, November 30, p. 701.

Mile-a-minute trains capture public imaginat (4 600 words and fig.)

1935 **656 .23 (0 (.**

Railway Age, No. 22, November 30, p. 708.

Contribution of equipment to better passenger t fic outlook. (2 700 words and fig.)

1935 **621 .13 (0 & 625 .23**

Railway Age, No. 22, November 30, p. 712.

KUHLER (O.). — **Appeal design in railroad eq** ment. Merchandising interprets the modern in product by style design. — This must be done by railroad. (3 600 words and fig.)

1935 **656 .23 (.73) & 659 (**

Railway Age, No. 22, November 30, p. 717.

EMERY (J. C.). — The Federal co-ordinator's re on passenger traffic. (2 000 words.)

1935 **656 .1 (**

Railway Age, No. 22, November 30, p. 720.

Motor transport aids traffic recovery. (2 000 w and fig.)

1935 **659 (**

Railway Age, No. 22, November 30, p. 723.

British Railways succeed in retaining passenger tronage. (2 800 words and fig.)

1935 **625 .14 (**

Railway Age, No. 22, November 30, p. 728.

What of the **track** ? — Greater strength and re ments in maintenance not heretofore warranted n high-speed train service possible. (3 300 words fig.)

1935 **656 .25 (**

Railway Age, No. 22, November 30, p. 732.

Signaling improvements as an aid in increasing t speeds. (2 600 words and fig.)

1935 **625 .17 (**

Railway Age, No. 23, December 7, p. 747.

New Haven eliminates section gangs. — Substit well equipped, heavy-work and « spotting » gangs indefinite territories — uses highway motor tr (3 600 words and fig.)

1935 **385 .15 (**

Railway Age, No. 23, December 7, p. 761.

Eastman and Dunn discuss railroads. — Co-ordin hopeful that deadweight ratio may be reduced railroads. — Government ownership a forerunne state socialism, says Dunn. (3 700 words.)

35 625 .215 (.73) & 625 .216 (.73)
vay Age, No. 23, December 7, p. 764.
TTERSON (W. J.). — **Freight-car truck** design draft-gear maintenance. (2 900 words.)

35 624 .1 (.73)
vay Age, No. 24, December 14, p. 782.
rge **reinforced concrete piles** prove more economical Missouri Pacific. (3 100 words and fig.)

35 385 .3 (08 (.73) & 621 .138.5 (.73)
vay Age, No. 24, December 14, p. 787.
-ordinator reports on **comparative costs of steam notive repairs.** (4 500 words.)

Railway Engineering and Maintenance. (Chicago.)

35 625 .17 (.73)
vay Engineering and Maintenance, Decemb., p. 732.
iminating the section gang. — Reorganization of k forces put in effect on the New Haven during last summer. (4 000 words and fig.)

35 625 .14
vay Engineering and Maintenance, Decemb., p. 738.
andardization of track materials and tools. — t can be done about it ? (5 000 words.)

Railway Gazette. (London.)

35 621 .132.5 (.47)
vay Gazette, No. 23, December 6, p. 963.
w 4-14-4 type locomotive for the U. S. S. R. Rail-s. (900 words and fig.)

35 385 .113 (.42) & 385 .114 (.42)
vay Gazette, No. 23, December 6, p. 964.
ilway operating efficiency. A six years' analysis he principal railway operating statistics. (2 600 ls and tables.)

35 625 .175 (.82)
vay Gazette, No. 23, December 6, p. 967.
RESWELL (F. L.). — **Motor trolley maintenance ermanent way in Argentina.** — III. (1 800 words diagram.)

35 625 .27 (.42)
vay Gazette, No. 23, December 6, p. 971.
w sleeper depot, Great Western Railway. (900 ls and fig.)

35 621 .133.7 (.42) & 725 .33 (.42)
vay Gazette, No. 23, December 6, p. 977.
large water softener at King's Cross, L. N. E. Ry. words and fig.)

1935 625 .232 (.493)
Railway Gazette, No. 24, December 13, p. 1007.
New **Belgian all-steel rolling stock.** (450 words and fig.)

1935 385 (093 (.43)
Railway Gazette, No. 24, December 13, p. 1008.
100 years of German Railways. (2 800 words and fig.)

1935 625 .616 (.81)
Railway Gazette, No. 24, December 13, p. 1015.
New **metre-gauge locomotives** for South America. (1 300 words and fig.)

1935 385 (072 (.42)
Railway Gazette, No. 24, December 13, p. 1019.
The new **L. M. S. research laboratory** at Derby. (2 300 words and fig.)

1935 656 .212.5 (.42)
Railway Gazette, No. 24, December 13, p. 1021.
New **hump yard** at Hull, L. N. E. Ry. (350 words and fig.)

1935 625 .26 (.42)
Railway Gazette, No. 25, December 20, p. 1060.
New Nord **carriage inspection sidings** in Paris. (750 words and fig.)

1935 621 .94, 621 .95 & 625 .212
Railway Gazette, No. 25, December 20, p. 1061.
ANDREW (C. D.). — Machining of **railway wheels and tyres.** (2 100 words.)

1935 385. (09 (.91)
Railway Gazette, No. 25, December 20, p. 1063.
Fifty years of railways in Malaya, 1885-1935. (2 000 words and fig.)

1935 625 .144 (.42)
Railway Gazette, No. 25, December 20, p. 1066.
A new **electric tamper.** (1 000 words and fig.)

1935 656 .1 (.42)
Railway Gazette, No. 25, December 20, p. 1071.
Trolleybus services in London. (1 500 words and fig.)

1935 621 .131.3 (.44)
Railway Gazette, No. 26, December 27, p. 1096.
French **dynamometer cars.** (2 000 words and fig.)

1935 621 .138.5 (.66) & 625 .26 (.66)
Railway Gazette, No. 26, December 27, p. 1099.
SELLS (Major M. P.). — The **locomotive, carriage and wagon workshops** of the Nigerian Railway. (1 500 words, tables and fig.)

1935 621 .9 (.42)
Railway Gazette, No. 26, December 27, p. 1103.
A new **machine tool for repetition work.** — An automatic drilling and reamering machine with separate motor-driven heads. (400 words and fig.)

1935 **621 .132.7 (.42) & 621 .43 (.42)**

Diesel Ry. Traction, p. 1121, Supplt. to the Ry. Gazette, December 27.

A new British **shunting locomotive.** — Crossley engines for heavy duties. (400 words and fig.)

1935 **621 .43**

Diesel Ry. Traction, p. 1122, Supplt. to the Ry. Gazette, December 27.

Progress in **engine design.** — Many new models in 1935. (1 000 words and fig.)

1935 **621 .43 (.43)**

Diesel Ry. Traction, p. 1123, Supplt. to the Ry. Gazette, December 27.

Four new German engines. (500 words and fig.)

1935 **621 .43 (.4)**

Diesel Ry. Traction, p. 1125, Supplt. to the Ry. Gazette, December 27.

The Diesel conquest of Europe. (1 100 words and fig.)

1935 **621 .43 & 621 .8**

Diesel Ry. Traction, p. 1128, Supplt. to the Ry. Gazette, December 27.

Better and brighter solutions to the **Diesel transmission** problem. (1 400 words and fig.)

1935 **621 .43 (.5 + .6 + .9)**

Diesel Ry. Traction, p. 1130, Supplt. to the Ry. Gazette, December 27.

Slow progress (of Diesel traction) in Africa, the East, and Australasia, but prospects for the immediate future are bright. (700 words and fig.)

1935 **621 .43 (.44)**

Diesel Ry. Traction, p. 1132, Supplt. to the Ry. Gazette, December 27.

Diesel railcar services in France. — Notable increase during the year. (800 words and fig.)

1935 **621 .43 (.8)**

Diesel Ry. Traction, p. 1134, Supplt. to the Ry. Gazette, December 27.

Big Diesel advance imminent in South America. (1 600 words and fig.)

1935 **621 .43 (.460)**

Diesel Ry. Traction, p. 1136, Supplt. to the Ry. Gazette, December 27.

Diesel traction makes big forward movement in Spain. (1 100 words and fig.)

1935 **621 .43 (.7)**

Diesel Ry. Traction, p. 1138, Supplt. to the Ry. Gazette, December 27.

SIMONS (R. L.). — **Diesel railway traction in America in 1935.** (1 300 words and fig.)

Railway Mechanical Engineer. (Philadelphi

1935 **621 .335 (.73) & 621 .43 (**

Railway Mechanical Engineer, December, p. 487.

Atchison, Topeka and Santa Fe gets largest **D locomotive.** (2 900 words and fig.)

1935 **621 .134.1 (.73) & 621 .135.2 (**

Railway Mechanical Engineer, December, p. 490.

Roller-bearing rods in passenger service over a (3 400 words and fig.)

1935 **656**

Railway Mechanical Engineer, December, p. 496.

DE BELL (G. W.) & RIPETZ (A.). — **Air resist of passenger trains.** (2 900 words and fig.)

Railway Signaling. (Chicago.)

1935 **656 .258 (**

Railway Signaling, December, p. 623.

Mechanical plant replaced by electric interlock (1 800 words and fig.)

1935 **656 .254 (**

Railway Signaling, December, p. 626.

Centralized traffic control installed on the Pittsbu and Lake Erie. (3 400 words and fig.)

1935 **656 .258 (**

Railway Signaling, December, p. 631.

Interlockings combined on the Boston and Ma (2 200 words and fig.)

1935 **656 .258 (**

Railway Signaling, December, p. 635.

Chicago Great Western constructs **automatic in locking.** (2 500 words and fig.)

1935 **62. (01 (.73) & 656 .25 (**

Railway Signaling, December, p. 638.

MOORE (A. Davis). — **Test panel for signal s** (700 words and fig.)

The Oil Engine. (London.)

1935 **621 .4 (064 (**

The Oil Engine, November, p. 208.

Transport engines shown at the Commercial M Exhibition. (2 000 words and fig.)

1935 **621 .43 (**

The Oil Engine, November, p. 215.

MANN (Ch. F. A.). — **New American oil-eng locomotives.** (900 words and fig.)

1935 **621 .43 (.73) & 656 .222.1 (**

The Oil Engine, November, p. 228.

MANN (Ch. F. A.). — **The performance of Burlington Zephyrs.** (2 000 words and fig.)

935 621 .43 (.42)
Oil Engine, November, p. 232.
he 18th railcar for the G. W. Ry. (1 300 words and

935 621 .43 (.73)
Oil Engine, December, p. 252.
ANN (Ch. F. A.). — The « Mark Twain » train.
) words and fig.)

935 621 .43 (.43)
Oil Engine, December, p. 254.
il-engined traction on German Railways. (450
ds and 1 table.)

The Locomotive. (London.)

935 621 .132.3 (.51) & 621 .132.5 (.51)
Locomotive, December 14, p. 372.
-8-4 type locomotives for the Chinese National Rail-
rs. (1 600 words and fig.)

935 621 .132.3 (.42)
Locomotive, December 14, p. 374.
ebuilt « Royal Scot » locomotive with taper boiler,
M. and S. Ry. (800 words and fig.)

935 621 .132.6 (.42)
Locomotive, December 14, p. 376.
-8-4 three-cylinder tank locomotive for Czechoslo-
ia. (800 words and fig.)

935 621 .131.3 (.42) & 656 .222.1 (.42)
Locomotive, December 14, p. 377.
Recent French locomotive performances. (1 800
rds and fig.)

935 621 .132.5 (.47)
Locomotive, December 14, p. 380.
Fourteen-coupled locomotive for Russian Railways.
100 words and fig.)

935 621 .134.3 (.4)
Locomotive, December 14, p. 385.
Recent continental development of the Lentz poppet
ve gear. (1 200 words and fig.)

935 621 .43 & 621 .8
Locomotive, December 14, p. 390.
KOFFMANN (J. L.). — Railcar transmission. (3 000
rds and fig.)

935 621 .33 (.439)
Locomotive, December 14, p. 395.
Hungarian State Railways electrification. (800
rds and fig.)

935 625 .116 (.81)
Locomotive, December 14, p. 396.
-8-2 locomotives for the San-Paulo-Parana Planta-
ns Ltd. (1 000 words and fig.)

1935 621 .43 (.41)
The Locomotive, December 14, p. 399.
Railcars in Northern Ireland. (3 300 words.)

Transit Journal. (New York.)

1935 388 (.42)
Transit Journal, No. 13, December, p. 442.
World's largest transit system. (2 600 words and fig.)

1935 388 (.73)
Transit Journal, No .13, December, p. 453.
What New York unification would mean. (Proposed consolidation of all subway and elevated lines in the city.) (1 000 words and fig.)

In Spanish.

Anales de la Asociación de Antiguos Alumnos del I. C. A. I. (Madrid.)

1935 621 .392
Anales de la Asociación de Antiguos Alumnos del I. C. A. I., noviembre, p. 588.
REZOLA (R. de E.). — Notas sobre soldadura eléctrica como elemento de construcción. (Soldadura del acero laminado y forjado.) (2 700 palabras & fig.) (Continuará.)

Boletín de la Asociación General de transportes por vía férrea. (Madrid.)

1935 621 .43 (.460)
Boletín de la Asociación General de transportes por vía férrea, suplemento, octubre, p. 169.
Pedido de la Compañía de los caminos de hierro del Norte de España, de cuatro trenes articulados, de cuatro unidades, a la Sociedad Española de Construcciones Babcock & Wilcox. (700 palabras & fig.)

1935 621 .43 (.43)
Boletín de la Asociación General de transportes por vía férrea, suplemento, octubre, p. 173.
Los nuevos trenes alemanes para más de 160 kilómetros por hora con 1 200 C.V. (2 000 palabras & fig.)

Caminos de hierro. (Madrid.)

1935 385 .517 (.460)
Caminos de hierro, noviembre, p. 322.
CASTILLO (M.). — El Colegio de Huérfanos de Ferroviarios de Torremolinos. (3 100 palabras & fig.)

Ferrocarriles y Tranvías. (Madrid.)

1935 388 (.460)
Ferrocarriles y Tranvías, diciembre, p. 347.
REYES (F.). — El enlace ferroviario de Madrid. (4 400 palabras & fig.)

1935 **659**

Ferrocarriles y Tranvías, diciembre, p. 353.

JESUS DE LA FUENTE. — **La propaganda del ferrocarril y de sus servicios.** (4 300 palabras & fig.)

1935 **621 .33**

Ferrocarriles y Tranvías, diciembre, p. 359.

LEUTHOLD (A.). — **Primeras installaciones de rectificadores que permiten la recuperación en una red ferroviaria.** (2 600 palabras & fig.)

Hormigón y Acero. (Madrid.)

1935 **691**

Hormigón y Acero, diciembre, p. 509.

CAMPUS (F.). — **Esfuerzos producidos en el hormigón a consecuencia de las variaciones de volumen.** (1 400 palabras & fig.)

Revista del Consejo Administrativo de los Ferrocarriles Nacionales de la República de Colombia. (Bogotá.)

1935 **625 .142.2**

Rev. del Consejo Administr. de los F. F. C. C. Nacion. de la República de Colombia, septiembre, p. 391.

Inmunización de traviesas. (5 000 palabras.)

Revista de Ingeniería industrial. (Madrid.)

1935 **621 .33 (.460)**

Revista de Ingeniería industrial, diciembre, p. 419.

VIANI (M.). — **La electrificación de nuestros ferrocarriles.** (6 800 palabras & fig.)

In Italian.

Annali dei lavori pubblici. (Roma.)

1935 **625 .13 (.45)**

Annali dei lavori pubblici, luglio, p. 513.

NAPOLI (A. di). — **Gli impianti idrici della Direttissima Bologna-Firenze.** (12 400 parole & fig.) (Continua.)

1935 **656 .256.3 (.4**

Annali dei lavori pubblici, agosto, p. 620.

ROMANO (D.). — **L'impianto del blocco automati lungo la Direttissima Bologna-Firenze.** (17 000 par & fig.)

In Dutch.

De Ingenieur. (Den Haag.)

1935 **721**

De Ingenieur, No. 51, 20 December, p. B. 263.

TERZAGHI (K. von). — **Die Setzung der Fundieru gen und ihre Wirkung auf den Oberbau.** (17 400 wo den & fig.)

1936 **6**

De Ingenieur, No. 1, 3 Januari, p. Bt. 1.

PEISER (B.). — **Schokbeton.** (3 900 woorden fig.)

1936 **624. (.49**

De Ingenieur, No. 2, 10 Januari, p. B. 1.

VAN DER VEEN (K. H. C. W.). — **De verbeteri van de verkeerstoestanden te Amsterdam-Oost.** (7 8 woorden & fig.)

Spoor- en Tramwegen. (Utrecht.)

1935-1936 **625 .2**

Spoor- en Tramwegen, N° 26-27, 17-31 December, p. 60
N° 1, 7 Januari, p. 7.

HARDEMAN (W. F. K.). — **Verhooging van comfo in treinen door koeling van lucht.** (3 700 woorden fig.)

1935 **621 .33 (.43**

Spoor- en Tramwegen, N° 26-27, 17-31 December, p. 6

REINÖHL (R.). — **De electrificatie der Oostenrij sche Spoorwegen.** (2 400 woorden.)

1935 **621 .132.1 (.4**

Spoor- en Tramwegen, N° 26-27, 17-31 December, p. 6

ROSENTHAL (G. A.). — **Stoomlocomotieven van « Etat français ».** (2 000 woorden & fig.)

1936 **625 .172 (.49**

Spoor- en Tramwegen, N° 1, 7 Januari, p. 5.

KERKHOVEN (E.). — **Onkruidverdelging.** (6 woorden & fig.)

M. Weissenbruch Co., Ltd., Printer of the King, 49, rue du Poinçon, Bruxelles.

MONTHLY BIBLIOGRAPHY OF RAILWAYS [1].

PUBLISHED UNDER THE SUPERVISION OF

P. GHILAIN,

General Secretary of the Permanent Commission of the International Railway Congress Association.

(APRIL 1936)

016. 385. (02]

I. — BOOKS.

In French.

936 625 .3

JNNER (P.).

s chemins de fer aux prises avec la nature alpestre.

enoble, Allier, Père et Fils, 26, Cours Jean Jaurès. lume (15 × 25), 334 pages, 15 planches hors texte igures.

936 621 .392

RUN (M.).

soudure électrique à l'arc, et la soudure à l'hyène atomique.

ris, Office central de l'Acétylène. 1 volume (19 × 172 pages et 135 figures. (Prix : 15 fr. français.)

936 621 .43

ETZ (A.-I.).

avenir du moteur Diesel dans les chemins de fer.

fayette (Indiana) Etats-Unis. Purdue University. ochure (15 × 22.5), 47 pages, 3 graphiques.

936 385. (01 (.59)

GNAN (A.).

achèvement du transindochinois.

ris, Moniteur des Travaux Publics, 23, rue de eaudun. 1 volume, 214 pages. (Prix : 25 fr. fran-)

936 624. (06

émoires de l'Association internationale des Ponts harpentes. Tome III.

rich, Leemann, Frères et Cie, 64, Stockerstrasse. lume, 438 pages et figures. (Prix : 30 fr. suisses.)

936 62. (01

HTERGAL (A.).

tit formulaire de résistance des matériaux. Tome Applications.

ris et Liége, Ch. Béranger. 1 volume (11 × 16), ages et 99 figures. (Prix : 7.50 fr. français.)

1936 691 & 721 .9

NACHTERGAL (A.).

Aide-mémoire pratique du béton armé appliqué au bâtiment.

Paris et Liége, Ch. Béranger. 1 volume (11 × 18), 254 pages, 184 figures. (Prix : 25 fr. français.)

1935 621 .131

ROCARD (Y.).

La stabilité de route des locomotives.

Paris, Hermann et Cie. 1 volume, 65 pages, 11 figures. (Prix : 15 fr. français.)

In German.

1935 62. (01

FÖPPL (L.) und NEUBER (H.).

Festigkeitslehre mittels Spannungsoptik.

München und Berlin, R. Oldenbourg. 1 Band. (Preis : 6.60 R.M.)

1935 669 .1

GRÜTZNER (A.).

Eisen- und Stahllegierungen.

Berlin, Verlag Chemie. 1 Band, 425 Seiten. (Preis : 48 R.M.)

1935 536

HABERT (F.).

Wärmetechnische Tafeln.

Berlin, Julius Springer. 1 Band, 145 Seiten. (Preis: 14.50 R.M.)

1935 691

HUMMEL (A.).

Das Beton- ABC.

Berlin, Chemisches Laboratorium für Tonindustrie und Tonindustrie-Zeitung. 1 Band, 150 Seiten und 38 Abbildungen. (Preis : 8 R.M.)

1936 625 .215

LIECHTY (R.).

Messungen über die Spurführung bogenläufiger Eisenbahnfahrzeuge.

Bern, Aerni-Leuch, Ed. 1. Band : 32 Seiten und 18 Abbildungen. 2. Band : Beilagen. 1. Teil. 3. Band : Beilagen 2. Teil.

(1) The numbers placed over the title of each book are those of the decimal classification proposed by the Railway Congress ointly with the Office Bibliographique International, of Brussels. (See « Bibliographical Decimal Classification as applied to lway Science », by L. Weissenbruch, in the number for November 1897, of the *Bulletin of the International Railway Congress*, 1509).

1935 721 .1

LOOS (W.).

Praktische Anwendung der Baugrunduntersuchungen bei Entwurf und Beurteilung von Erdbauten und Gründungen.

1 Band, 95 Abbildungen.

1935 621 .392

MELLER (K.).

Taschenbuch für die Lichtbogenschweissung.

Leipzig, S. Hirzel. 1 Band, 189 Seiten und 83 Abbildungen. (Preis : 5 R.M.)

1935 625 .1

SCHAUB (A.).

Eisenbahnbau.

Leipzig und Berlin, Teubner. 1 Band, 356 Abbildungen.

In English.

1936 313 : 621 .33 (.73) & 625 .62 (.73)

New York, McGraw-Hill Publishing Company Inc., 330 West 42d Street. Transit Journal. Issue for January 1936. Annual statistical number.

1936 656 .25 (06 (.73)

ASSOCIATION OF AMERICAN RAILROADS.

Proceedings, Signal Section. Advance notice, forty-second annual meeting, Chicago, Ill., March 9 and 10, 1936.

New York, Published by the Signal Section, A. A. R., 30, Vesey Street. Vol. XXXIII, No. 1, 390 pages.

1935 3

Education for social control. (A series of articles edited by Harold BENJAMIN, Ph. D.

Philadelphia, Pa. Annals, American Academy of Political and Social Science, 3457, Walnut Street. Issue for November 1935.

1935 38 & 656

DUNNAGE (J. A.), F. I. T. A., A. M. Inst. T.

Transport and the Public.

London, S.W.1. P. S. King and Son, Ltd., 14, Great Smith Street, Westminster. (Price : 6 sh.)

1936 669 .1

GREAVES (R. H.).

Chromium steels.

London. H. M. Stationery Office (Price : 7 sh. 6 d. net.)

1935 62. (02

Kempe's engineer's year-book 1936.

42nd. edition, revised under the direction of L. St. L. Pendred.

London. Published by Morgan Bros., Ltd. (4 1/2 × 7 1/4 inches), 2664 pages, tables, diagrams, photographs. (Price : Leather, 31 sh. 6 d. net in Great Britain.)

1936 621.

Mechanical World year book.

Manchester, England. Published by Emmott and Ltd., 31, King Street West. (4 1/2 × 6 1/2 inche 360 pages. (Price : 1 sh. 6 d. net.)

1935 351 .

MERRILL (David H.) and COMBS (Theodore C.).

Specification documents for building materials a construction.

Los Angeles (Calif.). Published under the direct of Pacific Coast Building Officials Conference. (6 × inches), 552 pages, tables, photographs and numer line drawings. (Price : cloth $ 5.00.)

1935 624 .63 (.

NICHOLS (H. J.), B. Sc., M. I. C. E., A. M. I. M. E

Frame arch spans for railway loadings.

Delhi. Copies obtainable from the Manager of blications. Technical paper No. 294. (Price : As. 14-0 or 1 sh. 6 d.)

1935 624. (06 & 69. (

Publications of the International Association bridge and structural engineering. Vol. III.

Zurich. For sale at Ag. Gebr. Leeman and 2, Stockerstrasse. (6 1/2 × 9 1/2 inches), 438 pag Charts, photographs, tables. (Price : 30 Swiss franc

---

1935 625 .1 (.

RAY (K. B.), B. E., C. E., Executive Engineer, East Bengal Ry.

Hints on the construction of a railway in the pla (with special reference to Bengal).

Delhi. Copies obtainable from the Manager of blications, Technical paper No. 292. 123 pages. (Pri As. 0-14-0 or 1 sh. 6 d.)

1935 385. (08 (.9

SOUTH AUSTRALIAN RAILWAYS.

Annual report of the Commissioner for the y 1934-35.

Adelaide. Frank Trigg, Government Printer, No Terrace. 35 pages, tables and a map.

1935 6

SPIERS (H. M.), M. A.

Technical data on fuel.

London, W.C.2. The British National Committ World Power Conference, 36, Kingsway. (Price : 12 6 d. net.)

1935 621 .392 & 669

Symposium on the welding of iron and steel, 19 2 volumes.

London, S.W.1. The Iron and Steel Institute, Victoria Street. (Price : £ 2-2 sh. net the two v

---

1935 385. (08 (.

THE UNION OF SOUTH AFRICA.

Report of the General Manager of Railways a Harbours for the year ended 31st March 1935.

Pretoria. Government Printer. 244 pages, tabl figs. and maps. (Price : 7 sh. 6 d.)

935 62. (01

NER (C. A. P.).

asticity. — Structure and strength of materials in engineering construction. Part II.

icago. A. C. McClurg Co. (6 1/4 × 9 1/4 inches). ages and tables. Sold as an addendum to Part I out extra charge.

In Italian.

1935 **625 .13 (.45)**

MARONE (E.).

La Direttissima Bologna-Firenze e la grande galleria dell'Appennino.

Bologna. Stab. ti poligrafici riuniti. 2 volumi (220 × 320), uno di 144 pagine col testo, figure e tabelle, l'altro con 33 tavole.

016. 385. (05]

II. — PERIODICALS.

In French.

Arts et Métiers. (Paris.)

936 **62. (01 & 721 .9**

s et Métiers, janvier, p. 9.

IRARD. — Abaques pour le **calcul des dalles et tres en béton armé** soumises à une flexion simple.. 00 mots & fig.)

Bulletin de la Société d'encouragement pour l'industrie nationale. (Paris.)

935 **656 (.44)**

. de la Soc. d'encourag. pour l'ind. nat., décembre, p. 613.

AEDERICH (G.). — Le rail et la route. (3 400 s.)

935 **656 (.44)**

. de la Soc. d'encourag. pour l'ind. nat., décembre, p. 621.

EVILLE (A.-E.). — Le déficit des chemins de fer a **coordination des transports.** (4 000 mots.)

Bulletin de la Société des ingénieurs civils de France. (Paris.)

936 **621 .13**

. de la Soc. des ing. civ. de France, P.-V. de la séance du 24 janvier, p. 33.

HAPELON. — Les progrès récents de la locomotive apeur. (1 900 mots.)

Bulletin de l'Union internationale des chemins de fer. (Paris.)

936 **656 .222.5 (.73)**

. de l'Union intern. des ch. de fer, février, p. 41.

es progrès récents réalisés dans le **service des trains voyageurs** aux Etats-Unis et leurs effets sur le ic. (6 400 mots.)

1936 **621 .33 (.3)**

Bull. de l'Union intern. des ch. de fer, février, p. 49.

Les progrès de l'**électrification** des chemins de fer dans les principaux pays du monde en 1935. (3 900 mots.)

1936 **385. (09 (.55)**

Bull. de l'Union intern. des ch. de fer, février, p. 54.

Le **développement des voies de communication** en Perse (Iran) et le Chemin de fer Transiranien. (3 900 mots.)

1936 **625 .1 (.45)**

Bull. de l'Union intern. des ch. de fer, février, p. 59.

PETRORO (L.). — Le **perfectionnement des voies ferrées** en Italie. (2 100 mots.)

Bulletin des transports internationaux par chemins de fer. (Berne.)

1936 **385 .63 (.4)**

Bull. des transp. intern. par ch. de fer, janvier, p. 3.

Liste des lignes de chemins de fer et de services automobiles ou de navigation auxquelles s'applique la **Convention internationale concernant le transport des marchandises par chemins de fer** (C. I. M.) du 23 octobre 1924. (14 800 mots.)

1936 **385 .62 (.4)**

Bull. des transp. intern. par ch. de fer, janvier, p. 48.

Liste des lignes de chemins de fer et de services automobiles ou de navigation auxquelles s'applique la **Convention internationale du 23 octobre 1924 concernant le transport des voyageurs et des bagages par chemins de fer** (C. I. V.). (16 300 mots.)

1936 **385 .113 (.481)**

Bull. des transp. intern. par ch. de fer, janvier, p. 120.

Résultats d'exploitation des chemins de fer norvégiens durant l'exercice 1933-34. (400 mots.)

Bulletin technique de la Suisse romande. (Vevey.)

1936 **624 .2**

Bull. techn. de la Suisse romande, n° 3, 1er février, p. 25; n° 4, 15 février, p. 37.

HUEBNER (F.). — Les essais sur ouvrages existants. (4 800 mots.)

1936 **621 .43**
Bull. techn. de la Suisse romande, n° 4, 15 février, p. 39.
WAETJEN (C.-H.). — **Moteurs Diesel** suisses pour l'étranger. (1 700 mots & fig.)

1936 **621 .43 (.494)**
Bull. techn. de la Suisse romande, n° 4, 15 février, p. 45.
Les **autorails Diesel** des Chemins de fer Fédéraux. (600 mots.)

Chronique des transports. (Paris.)

1936 **656 (.44)**
Chronique des transports, n° 2, 25 janvier, p. 2.
La **coordination** du rail et de la route. (4 800 mots & fig.)

1936 **656 .23 (0**
Chronique des transports, n° 3, 10 février, p. 3.
Tarifs de transports et prix de la vie. (1 000 mots.)

Génie civil. (Paris.)

1936 **656 (.44)**
Génie civil, n° 2790, 1er février, p. 114.
L'état actuel, en France, de la **coordination des transports ferroviaires et routiers.** (1 500 mots & fig.)

1936 **624 .32 (.492)**
Génie civil, n° 2790, 1er février, p. 115.
Pont-route métallique, en construction sur le Waal, à Nimègue (Pays-Bas). (1 500 mots & fig.)

1936 **624 .1 & 721 .1**
Génie civil, n° 2791, 8 février, p. 135.
FAIVRE (L.). — Les **fondations** sur pieux à vis en béton armé. (2 300 mots & fig.)

1936 **621 .139**
Génie civil, n° 2791, 8 février, p. 142.
BATICLE (E.). — La durée optima d'amortissement d'un outillage. Cas des **locomotives de chemins de fer.** (800 mots.)

1936 **62. (01 & 624 .2**
Génie civil, n° 2792, 15 février, p. 153.
BORDIER (H.). — Calcul de la **résistance des poutres portiques et cadres continus.** (3 200 mots & fig.)

1936 **62. (01 & 691**
Génie civil, n° 2793, 22 février, p. 182.
LOSSIER (H.). — Les fissures du **béton armé.** (5 000 mots & fig.) (A suivre.)

1936 **621 .43 (.43)**
Génie civil, n° 2793, 22 février, p. 188.
Locomotive Diesel-hydraulique de 1 400 ch. des chemins de fer allemands. (900 mots & fig.)

Les Chemins de fer et les Tramways. (Pari

1936 **656 (.**
Les Chemins de fer et les Tramways, février, p.
Coordination des transports ferroviaires et routi
en Algérie, concernant le transport des marchandis
(5 000 mots.)

1936 **621 .335 (.44) & 625 .3 (.**
Les Chemins de fer et les Tramways, février, p.
VIE (G.). — Les **locomotives électriques des lig**
à crémaillère de la Rhune et de Superbagnères. (2
mots & fig.)

1936 **621 .43 (.**
Les Chemins de fer et les Tramways, février, p.
SPIESS (E.). — **Automotrice-fourgon** de 800 H
du Boston and Maine Railroad. (5 600 mots.)

1936 **621 .43 (.4**
Les Chemins de fer et les Tramways, février, p.
OGUREK (O.). — **Automotrice** polonaise. (5
mots & fig.)

1936 **621 .43 (.4**
Les Chemins de fer et les Tramways, février, p.
KEULEYAN (L.). — Les nouvelles **automotri**
Diesel-électriques VT 42 des Chemins de fer Fédéra
Autrichiens. (3 600 mots & fig.)

1936 **621 .135.5 & 625 .**
Les Chemins de fer et les Tramways, février, p.
RACZ (E.). — Etude sur le **freinage du matér**
roulant et de traction. (4 500 mots & fig.)

1936 **656 .21**
Les Chemins de fer et les Tramways, février, p.
GLATIGNY. — La desserte directe des quais
gares à voyageurs par les **véhicules routiers.** (1
mots & fig.)

Les transports modernes. (Paris.)

1935 **621 .335 (.**
Les transports modernes, septembre-octobre, p. 87.
Locomotives Oerlikon 2 Do 2, nos E. 701 et 702
Chemin de fer de Paris à Orléans. (2 000 mots & fi

L'Ossature métallique. (Bruxelles.)

1936 **624 (.4**
L'Ossature métallique, février, p. 62.
BLEICH (Fr.). — Les **ponts** sur le canal du Dan
à Vienne. (1 600 mots & fig.)

1936 **621 .392 (.47) & 624 .32 (.**
L'Ossature métallique, février, p. 72.
NIKOLAEV (G.). — **Pont-rail** de 45 mètres de port
sur la Dema (U.R.S.S.). (2 300 mots & fig.)

Revue générale des chemins de fer. (Paris.)

1936 **656 .1 (.437)**

vue générale des chemins de fer, février, p. 73.

BL. — Réglementation des **transports automobiles** Tchécoslovaquie. (7 000 mots.)

1936 **656 .235 (.44)**

vue générale des chemins de fer, février, p. 84.

LOHIER. — La nouvelle **tarification** des petits colis des expéditions de détail sur les Grands Réseaux nçais. (2 800 mots & fig.)

1936 **656 .257 (.44)**

vue générale des chemins de fer, février, p. 94.

BOILLOT (J.). — Les nouveaux **postes électrodyniques à leviers d'itinéraires** de la gare de Paris L. M. (5 000 mots & fig.)

1936 **385 .113 (.44)**

vue générale des chemins de fer, février, p. 104.

es **résultats de l'exploitation** des Grands Réseaux chemins de fer français en 1934. (12 000 mots.)

1936 **385 .113 (.43)**

vue générale des chemins de fer, février, p. 130.

es **Chemins de fer allemands** au cours de l'exercice 4. (8 000 mots.)

1936 **625 .13 (.44)**

vue générale des chemins de fer, février, p. 142.

Reconstruction par la Compagnie P. L. M. du **viaduc** la Cèze. (1 300 mots & fig.)

1936 **656 .211 (.45)**

vue générale des chemins de fer, février, p. 145.

a **nouvelle gare** de Florence. (1 700 mots & fig.)

1936 **621 .132.5 (.47)**

vue générale des chemins de fer, février, p. 156.

a nouvelle **locomotive à marchandises** type 2-7-2 Chemins de fer russes. (1 000 mots & fig.)

Revue universelle des mines. (Liége.)

936 **62. (01 & 691**

ue universelle des mines, février, p. 59.

AMPUS (F.). — **Tensions produites dans le béton le béton armé** par suite des variations de volume. 00 mots & fig.)

In German.

Die Lokomotive. (Wien.)

936 **621 .132.3 (.73)**

Lokomotive, Heft 1, Januar, S. 1.

ie **Pacific-Schnellzuglokomotiven** der Delaware und lson Co. 1914-1934. (2 400 Wörter und Abb.)

1936 **621 .132.1 (.42)**

Die Lokomotive, Heft 1, Januar, S. 5.

Die **neueren Lokomotiven** der London Midland & Schottischen Eisenbahn. (2 200 Wörter und Abb.) (Fortsetzung folgt.)

1936 **621 .132.3 (.43) & 621 .134.4 (.43)**

Die Lokomotive, Heft 1, Januar, S. 10.

1 C 1 **Mitteldruck-Verbund-Personenzuglokomotive,** Reihe 24 der Deutschen Reichsbahn. (1 400 Wörter und Abb.)

Glasers Annalen. (Berlin.)

1936 **621 .131.1**

Glasers Annalen, Heft 2, 15. Januar, S. 16.

VELTE. — Nomographische Lösung **fahrmechanischer und energietechnischer Aufgaben.** (3 000 Wörter und Abb.)

1936 **625 .113 & 625 .22**

Glasers Annalen, Heft 3, 1. Februar, S. 25.

HEUMANN. — **Krümmungswiderstand** von steifachsigen Gleisfahrzeugen mit zwei Achsen. (3 800 Wörter und Abb.)

Organ für die Fortschritte des Eisenbahnwesens. (Berlin.)

1936 **621 .132.3 (.43)**

Organ für die Fortschritte des Eisenbahnwesens, Heft 3, 1. Februar, S. 41.

WAGNER (R. P.). — Die 2 C 2-**Stromlinienlokomotive** der Deutschen Reichsbahn. (8 000 Wörter und Abb.)

1936 **621 .132.1 (.42)**

Organ für die Fortschritte des Eisenbahnwesens, Heft 3, 1. Februar, S. 53.

Neuere englische **Dampflokomotiven.** (5 200 Wörter und Abb.)

1936 **624 .32 (.492)**

Organ für die Fortschritte des Eisenbahnwesens, Heft 4, 15. Februar, S. 63.

MUNDT (Th.). — Die neue **Eisenbahnbrücke** über die Ysel bei Hattemerbroeck in der Linie Amersfoort-Zwolle. (3 800 Wörter und Abb.)

1936 **624 .32 (.67)**

Organ für die Fortschritte des Eisenbahnwesens, Heft 4, 15. Februar, S. 68.

SANDER. — **Eisenbahnbrücke** über den Zambesi in Ostafrika. (2 800 Wörter und Abb.)

1936 **625 .113 & 625 .144.2**

Organ für die Fortschritte des Eisenbahnwesens, Heft 4, 15. Februar, S. 73.

LEISNER. — **Überhöhungen und Seitenkräfte im Gleisbogen.** (5 300 Wörter, 3 Tafeln und Abb.)

Zeitschrift des Vereines Deutscher Ingenieure. (Berlin.)

1936 **698**

Zeitsch. des Ver. deutsch. Ing., Nr. 7, 15. Februar, S. 183.

KAPPLER (Fr.). — Vorbehandlung des Untergrundes für den Anstrich (1 100 Wörter, 2 Tafeln und Abb.)

Zeitschrift für das gesamte Eisenbahn-Sicherungswesen. (Berlin.)

1936 **625 .151 (.43)**

Zeitsch. für das gesamte Eisenb.-Sicherungsw., Nr. 2, 1. Februar, S. 13.

HERWIG & BUDDENBERG. — Die Reichsbahnweichen. (2 700 Wörter und Abb.) (Fortsetzung folgt.)

Zeitung des Vereins mitteleuropäischer Eisenbahnverwaltungen. (Berlin.)

1936 **621 .335 (.494)**

Zeitung des Vereins mitteleurop. Eisenbahnverw., Nr. 7, 13. Februar, S. 145.

MÜLLER (W.). — Leichte elektrische Triebwagen der Schweizerischen Bundesbahnen. (1 500 Wörter und Abb.)

1936 **656 .2 (.43)**

Zeitung des Vereins mitteleurop. Eisenbahnverw., Nr. 7, 13. Februar, S. 150.

MANTEY. — Konjunkturschwankungen im Reichsbahnverkehr. (1 400 Wörter.)

1936 **385 (.51)**

Zeitung des Vereins mitteleurop. Eisenbahnverw., Nr. 7, 13. Februar, S. 152.

MARSCHALL (A.). — Entwicklung und Aussichten des Eisenbahnwesens in China. (1 000 Wörter und Karte.)

In English.

Brotherhood of Locomotive Firemen and Enginemen's Magazine. (Cleveland, Ohio.)

1936 **625 .253 (.73)**

Brotherhood of Loc. Firemen and Enginemen's Magazine, January, p. 29.

WERLICH (C. J.). — No. 8-ET locomotive brake equipment. Comparison with No. 6-ET equipment. (3 500 words.)

Bulletin, American Railway Engineering Association. (Chicago, Ill.)

1935 **62. (01 (.73) & 624 .2 (.73)**

Bull., Amer. Ry. Engineering Asson, October, p. 7.

HUNLEY (J. B.). — Impact in steel railway bridges of simple span as derived from tests made on the Cleveland, Cincinnati, Chicago and St. Louis Railway, 1931-1934. (56 000 words, tables and fig.)

Journal, Institution of Civil Engineers. (London

1936 **621 .39 & 6**

Journal, Institut. of Civil Engineers, January, p. 37

DONKIN (S. B.). — Industrial, agricultural, a domestic heating, with electricity as a by-produ (15 000 words.)

1936 **627 (.4**

Journal, Institut. of Civil Engineers, January, p. 4

COEN CAGLI (H.). — Italian docks and harbou (13 000 words and fig.)

Engineer. (London.)

1936 **621 .**

Engineer, No. 4173, January 3, p. 4.

Oil engine traction in 1935. (4 500 words and fi

1936 **624 & 625 .**

Engineer, No. 4173, January 3, p. 7; No. 4174, Janua 10, p. 34.

Roads, bridges and tunnels in 1935. (5 900 wor and fig.)

1936 **621 .31 & 6**

Engineer, No. 4173, January 3, p. 12.

Hydro-electric power and irrigation schemes in 19 (2 000 words and fig.)

1936 **6**

Engineer, No. 4173, January 3, p. 21.

Shipbuilding and marine engineering in 1935. (4 2 words and fig.)

1936 **625 .**

Engineer, No. 4173, January 3, p. 24.

Locomotives of 1935. (1 000 words and fig.)

1936 **6**

Engineer, No. 4173, January 3, p. 25; No. 4174, Janua 10, p. 40.

Water supply and sanitary engineering in 19 (7 400 words and fig.)

1935 **621**

Engineer, No. 4173, January 3, p. 26; No. 4174, Janua 10, p. 38.

Electrical engineering in 1935. (8 200 words a fig.) (To be continued.)

1936 **53. (06 (.4**

Engineer, No. 4174, January 10, p. 41; No. 4175, Jan ary 17, p. 69; No. 4176, January 24, p. 105.

The Physical Society's Exhibition. (12 400 wor and fig.)

1936 **385 (091 (.4**

Engineer, No. 4175, January 17, p. 79.

British railways in 1935. (2 500 words.)

1936 **62. (01 (.42), 625 .13 (.42) & 625 .2 (.4**

Engineer, No. 4175, January 17, p. 84.

WITHERFORD (A.). — The manufacture and te ing of rolling stock equipment. (5 700 words and fi

Engineering. (London.)

936 **62.** (01 & **669** .1
ineering, No. 3651, Januarv 3, p. 8.
esearch work on **corrosion** in the United States. 00 words and fig.)

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936 **621** .94 (.42)
ineering, No. 3651, January 3, p. 23.
ocomotive **crankpin-grinding** and quartering ma- e. (1 300 words and fig.)

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936 **625** .616 (.81)
ineering, No. 3651, January 3, p. 25.
8-2 type metre-gauge **locomotives** for Brazil. (800 ds and fig.)

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936 **53.** (06 (.42)
ineering, No. 3652, January 10, p. 32; No. 3653, January 17, p. 58.
he Physical Society's Exhibition. (9 000 words and (To be continued.)

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936 **624** .8 (.42)
ineering, No. 3653, January 17, p. 62.
rrol-Werkspoor **bascule bridge** at Lambhill, Glas- (800 words and fig.)

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936 **625** .162 (.73) & **656** .259 (.73)
ineering, No. 3653, January 17, p. 75.
utomatic railway level-crossing barrier. (1 000 ds and fig.)

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936 **656** .222.1 (.44)
ineering, No. 3653, January 24, p. 83; No. 3654, January 31, p. 112.
ORD MONKSWELL. — **French railway runs in** . (6 000 words and fig.)

Engineering News-Record. (New York.)

935 **624** .51 (.73)
ineering News-Record, No. 25, December 19, p. 837.
ilding the Davenport **bridge** across the Mississipi. 0 words and fig.)

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935 **721** .1 (.73)
neering News-Record, No. 25, December 19, p. 842.
ONVERSE (F. J.). — **Cast-in-place short piles** high test results. (2 000 words and fig.)

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35 **624** .2
neering News-Record, No. 25, December 19, p. 844.
EMING (R.). — Coefficients for **beam deflections** r various loading arrangements. (850 words and

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35 **614** .8 (.73) & **721** (.73)
neering News-Record, No. 25, December 19, p. 856.
OMER (C. H.). — **Earthquake-resistant** construc- applied to California schools. (6 700 words.)

1936 **624** .1 (.73)
Engineering News-Record, No. 1, January 2, p. 12.
ALBERTSON (E. R.). — **Underpinning Camden approach** of Delaware River bridge. (1 800 words and fig.)

1936 **621** .392 (.73) & **624** .32 (.73)
Engineering News-Record, No. 2, January 9, p. 40.
DRESSER (G. L.). — **Welded highway bridge trusses** of 150-ft. span. (1 500 words and fig.)

1936 **624** .5 (09
Engineering News-Record, No. 2, January 9, p. 45.
MULLINS (H.). — A review of **self-anchored suspension bridges.** (2 900 words and fig.)

1936 **625** .7 (.73)
Engineering News-Record, No. 3, January 16, p. 71.
Annual Highway Number.

1936 **625** .13 (.73)
Engineering News-Record, No. 4, January 23, p. 111.
PURCELL (C. H.), ANDREW (Ch. E.) & WOODRUFF (G. B.). — The Yerba Buena **tunnel.** (2 000 words and fig.)

1936 **624** .8 (.73)
Engineering News-Record, No. 5, January 30, p. 145.
Lift span over Cape Cod Canal sets new precedents. (5 200 words and fig.)

Institution of Railway Signal Engineers. (Reading.)

1935 **656** .25 (0 (.42) & **656** .258 (.42)
Institution of Ry. Signal Engineers, Part I, p. 34.
EGGINTON (F. B.). — The nomenclature of **interlocking signals.** (11 000 words.)

1935 **656** .25 (0
Institution of Ry. Signal Engineers, Part I, p. 62.
PEARSON (A. J.). — Economic aspects of **railway signalling.** (8 500 words.)

1935 **656** .259
Institution of Ry. Signal Engineers, Part I, p. 87.
EDWARDS (F.). — Traffic actuated **road signals.** (12 000 words.)

1935 **016 : 656** .25
Institution of Ry. Signal Engineers, Part I, p. 169.
Library catalogue and particulars regarding loan of books. — **Index of Proceedings.**

Journal of Applied Mechanics, A. S. M. E. (New York.)

1935 **621** .82 & **621** .89
Journal of Applied Mechanics, A.S.M.E., December, p. A-121.
BAUDRY (R.), TICHVINSKY (L. M.). — **Journal bearing performance.** (3 700 words and fig.)

1935 **62. (01 & 669 .1**

Journal of Applied Mechanics, A.S.M.E., December, p. A-128.

HORGER (O. J.). — Effect of **surface rolling** on the fatigue strength of steel. (4 200 words and fig.)

1935 **62. (01 & 669**

Journal of Applied Mechanics, A.S.M.E., December, p. A-141.

MAULBETSCH (J. L.). — **Thermal stresses in plates.** (2 700 words and fig.)

1935 **62. (01 & 621**

Journal of Applied Mechanics, A.S.M.E., December, p. A-154.

JACOBSEN (L. S.). — **Torsional stresses** in shafts having grooves or fillets. (1 000 words and fig.)

Journal, Institution of Civil Engineers. (London.)

1935 **62. (01 & 721 .1**

Journal, Institution of Civil Engineers, December, p. 150.

GLANVILLE (W. H.), GRIME (G.) & DAVIES (W. W.). — The behaviour of **reinforced-concrete piles** during driving. (28 000 words, tables and fig.)

Journal, Institute of Transport. (London.)[1]

1936 **385 & 656 .23**

Journal, Institute of Transport, January, p. 173.

DAVIES (A.). — **Railway service to traveller and trader.** (6 300 words and fig.)

1936 **656**

Journal, Institute of Transport, January, p. 181.

RICHARDSON (A. W. C.). — **The development of town and country road passenger services.** (14 000 words.)

Mechanical Engineering. (New York.)

1936 **624 .51 (.73)**

Mechanical Engineering, January, p. 7.

PURCELL (C. H.). — The San Francisco-Oakland **bay bridge.** (10 000 words and fig.)

1936 **621 .43 & 621 .8**

Mechanical Engineering, January, p. 52.

Fluid drives on cars driven by **internal-combustion motors.** (700 words and fig.)

Modern Transport. (London.)

1935 **621 .132.6 (.42)**

Modern Transport, No. 876, December 28, p. 5.

Tank engines for L.M.S.R. — Two-cylinder type for passenger services. (1 100 words and fig.)

1936 **385 .1 (**

Modern Transport, No. 877, January 4, p. 3.

Transport bills in Parliament. — Signs of rene activity. (2 300 words and fig.)

1936 **621 .338 (.42) & 625 .4 (**

Modern Transport, No. 877, January 4, p. 4.

New **rolling stock** for London Underground. (1 words and fig.)

1936 **621 .43 (.42) & 656 .261 (**

Modern Transport, No. 877, January 4, p. 5.

Road-rail vehicles. — Progress and future deve ment. (1 800 words and fig.)

1936 **621 .**

Modern Transport, No. 877, January 4, p. 6.

Electric arc welding for railway crossings. words and fig.)

1936 **627 (.569) & 656 .213 (.5**

Modern Transport, No. 878, January 11, p. 3.

Port improvements at Jaffa. — New breakwa quays and transit sheds to facilitate trade and sh ping. (2 200 words and fig.)

1936 **385. (08 (.9**

Modern Transport, No. 878, January 11, p. 4.

Railway development in Australia. — The Victor Government system. (2 200 words.)

1936 **625 .245 (.73) & 656 .1 (.**

Modern Transport, No. 878, January 11, p. 6.

An American road-rail system. — Motor lorries s ply motive power. (700 words and fig.)

1936 **625 .14 (.43) & 656 .222.1 (.**

Modern Transport, No. 878, January 11, p. 7.

High-speed rail travel in Germany. — Fitting track to the train. (1 300 words and fig.)

1936 **621**

Modern Transport, No. 878, January 11, p. 8.

Locomotive storage. — Necessary precautions. words.)

1936 **347 .763 (.42) & 656 .1 (.**

Modern Transport, No. 878, January 11, p. 9.

The future of road transport. — Possible co-ordi tion on regional basis. (1 000 words.)

1936 **625 .17 (.**

Modern Transport, No. 879, January 18, p. 3.

WALLACE (W. K.). — Modern methods of tr **maintenance.** (3 200 words.)

1936 **621 .13 & 656 .2**

Modern Transport, No. 879, January 18, p. 7.

Steam locmotives and their capabilities. — Mr. N. Gresley on train speeds. (2 500 words.)

1936 625 .17 (.42)
dern Transport, No. 879, January 18, p. 8.
TRAIN (J. C. L.). — **The permanent way and its keep.** (2 200 words.)

1936 621 .43
dern Transport, No. 879, January 18, p. 9.
High-speed railcars in France for express passenger vices. (900 words and fig.)

1936 347 .763 (.42)
dern Transport, No. 880, January 25, p. 4.
Road transport acts. — Some necessary amendments. 00 words and 1 table.)

1936 656 .25 (.42)
dern Transport, No. 880, January 25, p. 5.
Mechanical signalling apparatus. — Design and macture. (1 200 words.)

1936 656. (.43)
dern Transport, No. 880, January 25, p. 6.
The transport industry in Germany. — Seven nal groups. (1 800 words.)

936 625 .17 (.42)
dern Transport, No. 880, January 25, p. 7.
Modern methods of track maintenance. — High speed uirements. (2 200 words.)

ceedings, American Society of Civil Engineers. (New York.)

935 624 .63
ceedings, Amer. Soc. of Civil Engineers, December, p. 1453.
REMIN (A. A.). — **Wind stresses in reinforced crete arch bridges.** (2 600 words and fig.)

935 624 .2
ceedings, Amer. Soc. of Civil Engineers, December, p. 1469.
UMENSKY (D. B.). — **Reinforced concrete mems under direct tension and bending.** (3 600 words fig.)

935 721 .3
ceedings, Amer. Soc. of Civil Engineers, December, p. 1493.
ILY (L. T.). — Rational design of **steel columns.** 00 words and fig.)

936 721
ceedings, Amer. Soc. of Civil Engineers, January, p. 3.
ITMER (F. P.) & BONNER (H. H.). — **Tall buil- frames studied by means of mechanical models.** 00 words and fig.)

936 624 .2
eedings, Amer. Soc. of Civil Engineers, January, p. 79.
ARCEL (J. I.) & MURER (E. B.). — Effect of ndary stresses upon ultimate strength. (2 500 ls.)

1936 721 .3
Proceedings, Amer. Soc. of Civil Engineers, January, p. 84.
YOUNG (D. H.). — Rational design of **steel columns.** (3 900 words and fig.)

1936 62. (01 & 621 .97
Proceedings, Amer. Soc. of Civil Engineers, January, p. 92.
PECK (J. S.) & RATHBUN (J. C.). — Elastic properties of **riveted connections.** (3 900 words and fig.)

1936 721 .1
Proceedings, Amer. Soc. of Civil Engineers, January, p. 142.
HOUSEL (W. S.) & NEWMARK (N. M.). — Distribution of **stresses** under a foundation. (8 000 words and fig.)

Railway Age. (New York.)

1935 385 .5
Railway Age, No. 26, December 28, p. 839.
How to increase railway employment. (2 500 words.)

1935 621 .139 (.73), 625 .18 (.73) & 625 .27 (.73)
Railway Age, No. 26, December 28, p. 843.
Chicago Great Western improves **stores handling.** (2 900 words and fig.)

1935 656 .256.2 (.73)
Railway Age, No. 26, December 28, p. 846.
NOBLE (S. E.). — **New signaling on the route** of the C. and N. W. « 400 ». (2 200 words and fig.)

1935 621 .132.3 (.73)
Railway Age, No. 26, December 28, p. 849.
Boston and Maine tests new **Pacific type locomotives.** (1 200 words and fig.)

1935 625 .244 (.73) & 656 .225 (.73)
Railway Age, No. 26, December 28, p. 854.
Perishable handling. — A mighty transportation spectacle. (3 300 words and fig.)

1935 625 .234 (.73)
Railway Age, No. 26, December 28, p. 857.
Pullman air-conditioning holdover feature. (500 words and fig.)

1935 656 .261 (.71)
Railway Age, No. 26, December 28, p. 858.
Can merchandise traffic be regained ? (2 400 words and fig.)

1935 656 .1 (.73)
Railway Age, No. 26, December 28, p. 861.
How the Fonda, Johnstown and Gloversville uses **motor vehicles.** (1 500 words and fig.)

1935 656 .1 (.73) & 656 .261 (.73)
Railway Age, No. 26, December 28, p. 862.
New Haven motorizes still further. (1 500 words and fig.)

1935 **656 .1 (.73)**
Railway Age, No. 26, December 28, p. 864.
Pacific Greyhound makes progress. Long-distance routes and train replacement services both prove successful in attracting passengers. (1 400 words and fig.)

1935 **347 .763 (.4)**
Railway Age, No. 26, December 28, p. 869.
Motor transport regulation in Europe. (4 800 words and fig.)

1936 **385 .113 (.73)**
Railway Age, No. 1, January 4, p. 6.
PARMELEE (J. H.). — A review of **railway operations** in 1935. (9 000 words, 10 tables and fig.)

1936 **656 .23 (.73)**
Railway Age, No. 1, January 4, p. 14.
DOSTER (R. A.). — **Traffic developments** during the year. (2 700 words and fig.)

1936 **385 .3 (.73)**
Railway Age, No. 1, January 4, p. 17.
LANE (H. F.). — **Association of American Railroads.** (4 400 words.)

1936 **385 .3 (.73)**
Railway Age, No. 1, January 4, p. 20.
LANE (H. F.). — **Activities of the Co-Ordinator in 1935.** (5 200 words.)

1936 **347 .763 (.73)**
Railway Age, No. 1, January 4, p. 24.
LANE (H. F.). — Interstate Commerce Commission begins **motor carrier regulation.** (2 000 words.)

1936 **313 : 621 .13 (.73) & 313 : 625 .2 (.73)**
Railway Age, No. 1, January 4, p. 26.
PECK (C. B.). — **Equipment reserves continued to decline in 1935.** (1 500 words, 2 tables and fig.)

1936 **313 : 625 .17 (.71 + .73)**
Railway Age, No. 1, January 4, p. 28.
LACHER (W. S.). — **Outlay for maintenance of way** largest since 1931. (2 500 words. 3 tables and fig.)

1936 **313 : 625 .111 (.73)**
Railway Age, No. 1, January 4, p. 32.
LACHER (W. S.). — **Dirt flies on grade crossing project.** (2 300 words and fig.)

1936 **347 .763 (.71)**
Railway Age, No. 1, January 4, p. 35.
Transportation legislation looms in Canada. (4 300 words.)

1936 **385 .113 (.73)**
Railway Age, No. 1, January 4, p. 39.
Mexican Railways show continued improvement in traffic. (1 900 words, 2 tables and fig.)

1936 **313 : 385 .1 (.73)**
Railway Age, No. 1, January 4, p. 41.
LYNE (J. G.). — **Bankruptcies break record in 1935.** (1 800 words, 11 tables, fig. and maps.)

1936 **313 : 625 .1 (.**
Railway Age, No. 1, January 4, p. 50.
BOYD (G. E.). — **Railway construction** still reced (2 700 words, tables and fig.)

1936 **313 : 621 .139 (.73), 313 : 625 .18 (.**
& 313 : 625 .27 (.
Railway Age, No. 1, January 4, p. 57.
STEEL (D. A.). — **Cost of railway materials** st dier in 1935. (5 600 words, tables and fig.)

1936 **313 .656 .25 (.**
Railway Age, No. 1, January 4, p. 66.
DUNN (J. H.). — **Signaling construction** increa during 1935. (3 000 words, tables and fig.)

1936 **313 : 625 .13 (.73) & 313 : 621 .43 (.**
Railway Age, No. 1, January 4, p. 71.
TAFT (W. J.). — **Locomotives ordered in 19** (600 words, tables and fig.)

1936 **313 : 625 .24 (.**
Railway Age, No. 1, January 4, p. 74.
KRAEGER (F. W.). — **Freight cars ordered in 19** (900 words, tables and fig.)

1936 **313 : 625 .23 (.**
Railway Age, No. 1, January 4, p. 79.
KRAEGER (F. W.). — **Passenger-train car ord** in 1935. (500 words, tables and fig.)

1936 **313 : 621 .43 (.**
Railway Age, No. 1, January 4, p. 81.
PECK (C. B.). — **Three motor trains ordered in 19** (800 words, tables and fig.)

1936 **313 : 625 .162 (.73) & 313 : 656 .259 (.**
Railway Age, No. 1, January 4, p. 83.
DUNN (J. H.). — **Crossing protection** installati increased during 1935. (1 200 words and tables.)

1936 **313 : 656 .254 (.**
Railway Age, No. 1, January 4, p. 87.
FRENCH (O. C.). — **Telegraph and telephone a** vity increased in 1935. (2 300 words, tables and fi

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1936 **313 : 656 .1 (.**
Railway Age, No. 1, January 4, p. 90.
LAYNG (Ch.). — **Railway motor transport** had boom year. (2 600 words and fig.)

Railway Engineering and Maintenance. (Chicag

1936 **625 .143.4 (.**
Railway Engineering and Maintenance, January, p.
Alton reconditions 150 000 rail ends in four mont time. (3 200 words and fig.)

1936 **621 .392 (.73) & 625 .13 (.**
Railway Engineering and Maintenance, January, p.
WILSON (A. R.). — **Welding in bridge work.** (words and fig.)

936 656 .259 (.73)
lway Engineering and Maintenance, January, p. 22.
aking the danger out of slides. (3 200 words and

936 625 .13 (.73) & 625 .17 (.73)
lway Engineering and Maintenance, January, p. 27.
/EBB (C. E.). — Better bridges require less main-
ance. (A review of the advances in steel bridge
tice.) (700 words and fig.)

936 621 .6 (.73) & 725 .33 (.73)
lway Engineering and Maintenance, January, p. 31.
ITZPATRICK (P. D.). — Direct delivery pumps
inate water tanks. (900 words and fig.)

936 625 .174 (.73)
way Engineering and Maintenance, January, p. 33.
UTTLE (A. S.). — Snow melting pits used at
th Station. (700 words and fig.)

Railway Gazette. (London.)

936 621 .13 (0 (.42) & 625 .235 (.42)
lway Gazette, No. 1, January 3, p. 5.
he railway colour question. (800 words and fig.)

936 621 .132.6 (.436) & 621 .133.8 (.436)
way Gazette, No. 1, January 3, p. 13.
ZEIGER (C.). — Recording the work performed
shunting locomotives. (900 words and fig.)

936 656 .25 (09 (.42)
way Gazette, No. 1, January 3, p. 15.
oneer work in railway safety. — II. — Lock-and-
k. (2 700 words.)

936 625 .172 (.494)
way Gazette, No. 1, January 3, p. 17.
ynamometer car track inspection equipment, Swiss
eral Railways. (1 600 words and fig.)

936 625 .132.1 (.42)
way Gazette, No. 1, January 3, p. 20.
M. S. orders for 369 locomotives. (500 words and

936 625 .174 (.44)
way Gazette, No. 1, January 3, p. 22.
ectric heating of points in snow, Italian State
ways. (900 words and fig.)

936 625 .143.3 & 625 .156
way Gazette, No. 1, January 3, p. 23.
rge rail and flange lubricator. (300 words and

936 656 .254
way Gazette, No. 1, January 3, p. 24.
ain describers. — The ribbon storage train descri-
of the Westinghouse Brake and Signal Co. Ltd.,
ecently installed at Fenchurch Street, L.N.E.R.
0 words and fig.)

1936 625 .143.2 (.42)
Railway Gazette, No. 2, January 10, p. 56.
ALLEN (C. J.). — Modern developments in the heat treatment of steel rails. (3 600 words and fig.)

1936 621 .132.3 (.68) & 621 .132.5 (.68)
Railway Gazette, No. 2, January 10, p. 65.
New 4-8-2 type locomotives for South Africa. (1 700 words and fig.)

1936 656 .212.6
Railway Gazette, No. 2, January 10, p. 67.
A new station platform tractor. (400 words and fig.)

1936 621 .94 (.42)
Railway Gazette, No. 2, January 10, p. 68.
New machine tools in railway shops. (900 words and fig.)

1936 385 .1 (.73)
Railway Gazette, No. 3, January 17, p. 106.
An application of the budget system to railways. (1 500 words and fig.)

1936 621 .132.3 (.44)
Railway Gazette, No. 3, January 17, p. 108.
The P.L.M. streamlined steam train. (1 700 words and fig.)

1936 656 .212.8 (.42)
Railway Gazette, No. 3, January 17, p. 117.
Mechanisation of railway goods depots. (1 100 words and 2 tables.)

1936 656 .212.5 (.42)
Railway Gazette, No. 4, January 24, p. 145.
New marshalling yard at Hull, L.N.E.R. (3 200 words and fig.)

1936 625 .616 (.475)
Railway Gazette, No. 4, January 24, p. 153.
New 2 ft. 6 in. gauge 0-10-0 type locomotives for the Lithuanian Railways. (900 words and fig.)

136 625 .232 (.42)
Railway Gazette, No. 4, January 24, p. 157.
New first class kitchen-dining cars, L.M.S.R. (1 000 words and fig.)

1936 385 .4 (.43)
Railway Gazette, No. 4, January 24, p. 163.
The structure and organisation of the Reichsbahn. (800 words and fig.)

1936 385 .13 (.42)
Railway Gazette, No. 5, January 31, p. 192.
Rating of railways. — House of Lords judgment in relation to the Southern Railway. (1 800 words.)

1936 621 .39
Railway Gazette, No. 5, January 31, p. 201.
The varied responsibilities of a railway electrical engineer. (2 900 words.)

1936 **621 .132.3 (.518)**
Railway Gazette, No. 5, January 31, p. 205.
Streamlined locomotives for the South Manchuria Railway. (500 words and fig.)

1936 **621 .94 (.42)**
Railway Gazette, No. 5, January 31, p. 206.
A new **railway wheel lathe.** (900 words and fig.)

1936 **625 .216 (.43)**
Railway Gazette, No. 5, January 31, p. 210.
Automatic couplings for locomotives and rolling stock. (700 words and fig.)

1936 **621 .132.3 (.43)**
Railway Gazette, No. 5, January 31, p. 212.
New German 2-4-2 **streamlined tank locomotives.** (450 words and fig.)

1936 **656 .222.1 (.42)**
Railway Gazette, No. 5, January 31, p. 218.
ALLEN (C. J.). — **Railway speed development** in 1935. I. — Great Britain and Ireland. (1 100 words and 3 tables.)

1936 **621 .337**
Electric Ry. Traction, p. 86, Supplt. to The Ry. Gazette, January 10.
Some systems of regenerative control for D. C. railways. (2 600 words and fig.)

1936 **621 .335 (.493)**
Electric Ry. Traction, p. 89, Supplt. to The Ry. Gazette, January 10.
New Belgian electric locomotive. (Double-bogie design for 1 500-volt (d.c. line.) (700 words and fig.)

1936 **621 .332**
Electric Ry. Traction, p. 90, Supplt. to The Ry. Gazette, January 10.
Electric-magnetic induction. (700 words and fig.)

1936 **621 .43 (.43)**
Diesel Ry. Traction, p. 174, Supplt. to the Ry. Gazette, January 24.
REED (B.). — **Diesel traction** on the Reichsbahn. (5 000 words and fig.)

1936 **621 .43 (.44) & 656 .222.1 (.44)**
Diesel Ry. Traction, p. 182, Supplt. to the Ry. Gazette, January 24.
The Renault record run in France. (300 words and fig.)

1936 **621 .43 (.460)**
Diesel Ry. Traction, p. 184, Supplt. to the Ry. Gazette, January 24.
Railcar traction on the M. Z. A. (900 words and fig.)

1936 **621 .43 (.494)**
Diesel Ry. Traction, p. 186, Supplt. to the Ry. Gazette, January 24.
Light-weight Diesel cars in Switzerland. (800 words and fig.)

Railway Magazine. (London.)

1936 **621 .13 (0 (.42) & 625 .235 (.**
Railway Magazine, January, p. 1.
COOPER (B. K.). — **Railway liveries.** (2 900 wo and 1 table.)

1936 **656 .222 (.**
Railway Magazine, January, p. 5.
British express train services in 1935. (2 200 wo and tables.)

1936 **656 .222.1 (.**
Railway Magazine, January, p. 13.
ALLEN (C. J.). — **British locomotive practice performance.** (4 400 words and fig.)

1936 **625 .6 (.**
Railway Magazine, January, p. 25.
BARRIE (D. S.) & ASTON (G. J.). — **Scottish li railways.** (4 400 words and fig.)

Railway Mechanical Engineer. (Philadelphia

1936 **621 .133.1 & 621 .133**
Railway Mechanical Engineer, January, p. 13.
WILLIAMS (A.). — **Steam rate and indicated sepower of locomotives.** (4 500 words, 2 tables fig.)

Railway Signaling. (Chicago.)

1936 **313 : 656 .25 (.**
Railway Signaling, January, p. 13.
Signal construction increased during 1935. (3 words, tables and fig.)

1936 **313 : 625 .162 (.73) & 656 .259 (.**
Railway Signaling, January, p. 19.
Highway-railroad crossing protection installat increased in 1935. (1 900 words and fig.)

1936 **656 .258 (.**
Railway Signaling, January, p. 23.
New York Central **interlocking** at Syracuse. (3 words and fig.)

1936 **656 .259 (**
Railway Signaling, January, p. 28.
Slide detector signals. (3 400 words and fig.)

1936 **625 .162 (.73) & 656 .259 (**
Railway Signaling, January, p. 32.
REICH (E. W.). — Reading installs **unique cros protection.** (1 600 words and fig.)

The Locomotive. (London.)

1936 **621**
The Locomotive, January 15, p. 1.
Diesel engines for rail traction. (1 900 words.)

36 621 .132.6 (.42)
Locomotive, January 15, p. 2.
ro-cylinder 2-6-4 passenger tank engines, L.M. & y. (1 300 words and fig.)

36 621 .132.3 (.68)
Locomotive, January 15, p. 4.
e « Union Limited » express, South African Rail-, and new Pacific type locomotives. (800 words fig.)

36 621 .131.2 (.73) & 621 .135 (01 (.73)
Locomotive, January 15, p. 11.
)ECKER (W. T.). — Static weight and weighing merican locomotives. (2 700 words and fig.)

36 621 .132.3 (.44) & 656 .222.1 (.44)
Locomotive, January 15, p. 19.
ie P.L.M. streamlined locomotive and its work. 00 words and fig.)

36 621 .134.3 (.4)
Locomotive, January 15, p. 24.
ecent continental developments of the Lentz poppet e gear. (900 words and fig.)

he Permanent Way Institution. (London.)

35 625 .143.3
Permanent Way Institution, Dec., p. 271.
CANCE (A.). — Wear of steels in its application teel rails. (3 800 words and fig.)

35 625 .144.4 & 625 .172
Permanent Way Institution, Dec., p. 286.
ENT (G. F.). — Measured shovel packing. (7 000 ls and fig.)

35 656 .211.5 (.42)
Permanent Way Institution, Dec., p. 306.
ESTON (W. H.). — Kingswear and Darmouth, oon landing stages. (3 300 words and fig.)

Transactions, American Society of Mechanical Engineers. (New York.)

35 621 .116 & 621 .165
nsactions, Amer. Soc. of Mech. Engineers, Novem- ber, p. 447.
TRAUB (F. G.). — Cause and prevention of tur- -blade deposits. (6 500 words and fig.)

35 621 .2
nsactions, Amer. Soc. of Mech. Engineers, Novem- ber, p. 455.
AVIS (L. M.). — Cavitation testing of model hy- lic turbines and its bearing on design and oper- n. (6 300 words and fig.)

1935 621 .135.1, 621 .135.4 & 625 .14 (01
Transactions, Amer. Soc. of Mech. Engineers, Novem- ber, p. 471.
CAIN (B. S.). — Safe operation of high-speed loco- motives. (7 500 words and fig.)

1935 621 .135 (01, 625 .14 (01 & 625 .215
Transactions, Amer. Soc. of Mech. Engineers, Novem- ber, p. 481.
LANGER (B. F.) & SHAMBERGER (J. P.). — Lateral oscillations of rail vehicles. (9 900 words and fig.)

1935 621 .131.1
Transactions, Amer. Soc. of Mech. Engineers, Novem- ber, p. 495.
WILLIAMS (A.). — Measurement of steam rate and indicated horsepower of locomotives. (5 000 words, 2 tables and fig.)

1935 536 & 621 .111
Transactions, Amer. Soc. of Mech. Engineers, Novem- ber, p. 517.
MULLIKIN (H. F.). — Evaluation of effective radiant heating surface and application of the Stefan — Boltzman law to heat absorption in boiler furnaces. (5 800 words, tables and fig.)

1935 536 & 621 .111
Transactions, Amer. Soc. of Mech. Engineers, Novem- ber, p. 531.
WOHLENBERG (W. J.) & MULLIKIN (H. F.). — Review of methods of computing heat absorption in boiler furnaces. (4 100 words and fig.)

1935 536 & 621 .111
Transactions, Amer. Soc. of Mech. Engineers, Novem- ber, p. 540.
WOHLENBERG (W. J.) & ARMACOST (W. H.). — An experimental investigation of heat absorption in boiler furnaces. (7 300 words and fig.)

1936 621 .89
Transactions, Amer. Soc. of Mech. Engineers, January, Section one, p. 25.
DENNISON (E. S.). — Film-lubrication theory and engine-bearing design. (900 words and fig.)

1936 621 .135.2
Transactions, Amer. Soc. of Mech. Engineers, January, Section one, p. 37.
PEARCE (E. S.). — Locomotive and car journal lubrication. (5 400 words and fig.)

1936 621 .94
Transactions, Amer. Soc. of Mech. Engineers, January, Section one, p. 47.
BOSTON (O. W.) & KRAUSS (C. E.). — A study of the turning of steel employing a new-type three-component dynamometer. (4 700 words and fig.)

1936 625 .216
Transactions, Amer. Soc. of Mech. Engineers, January, Section one, p. 65.
Draft-gear action in long trains. (1 000 words.)

1936 **621. (06 (.73)**

Transactions. Amer. Soc. of Mech. Engineers, January, Section two, p. RI-121.

Indexes to A.S.M.E. papers and publications.

1936 **621. (06 (.73)**

Transactions. Amer. Soc. of Mech. Engineers, January, Section two, p. RI-134.

Index to A.S.M.E. transactions.

In Spanish.

Anales de la Asociación de Antiguos Alumnos del I. C. A. I. (Madrid.)

1935 **621 .336**

Anales de la Asociación de Antiguos Alumnos del I. C. A. I., diciembre, p. 629.

MAC-VEIGH Y ALFOS (J.). — Abacos para cálculo mecánico y tendido de **catenarias de tracción.** (1 500 palabras & fig.)

1935 **621 .33 (.494)**

Anales de la Asociación de Antiguos Alumnos del I. C. A. I., diciembre, p. 648.

La **electrificación** de los ferrocarriles suizos. (400 palabras.)

Boletín de la Asociación General de transportes por vía férrea. (Madrid.)

1935 **621 .43 (.460)**

Boletín de la Asociación General de transportes por vía férrea, suplemento, diciembre, p. 201.

Descripción de los **automotores** de 275 C.V. de la Compañía de los Ferrocarriles de M. Z. A. construídos por la Maquinista Terrestre y Marítima. (5 700 palabras & fig.)

1935 **621 .43 (.460)**

Boletín de la Asociación General de transportes por vía férrea, suplemento, diciembre, p. 185.

Nuevas **locomotoras con motor Diesel** para el servicio de maniobras construídas por la Maquinista Terrestre y Marítima, de Barcelona, para la Compañía de Ferrocarriles de M. Z. A. (2 200 palabras & fig.)

Ferrocarriles y Tranvías. (Madrid.)

1936 **388 (.460)**

Ferrocarriles y Tranvías, febrero, p. 34.

REYES (F.). — El enlace ferroviario de Madrid. (5 200 palabras & fig.)

1936 **621 .43 (.460)**

Ferrocarriles y Tranvías, febrero, p. 44.

Los **automotores Diesel,** de 1 460 C. V. para la Compañía del Norte. (900 palabras & fig.)

Ingeniería y Construcción. (Madrid.)

1936 **691 (.**

Ingeniería y Construcción, febrero, p. 80.

Nuevas instrucciones para el empleo del **hormig armado** en las obras que dependen del Ministerio « Travaux publics ». (5 000 palabras.)

Revista de Ingeniería Industrial. (Madrid.)

1936 **621 .33 (.4**

Revista de Ingeniería industrial, enero, p. 6.

VIANI (M.). — La **electrificación** de nuestros fer carriles.

Revista de Obras Públicas. (Madrid.)

1936 **624**

Revista de Obras Públicas, N° 2, 15 de enero, p. 25

MENDIZABAL (D.). — Nueva instrucción suiza ra el cálculo de **construcciones métálicas.** (2 000 pa bras & fig.)

1936

Revista de Obras Públicas, N° 2, 15 de enero, p. 29

BOSCH (R. L.). — Acerca de la **dosificación hormigones.** (1 300 palabras.)

Rieles argentinos. (Buenos Aires.)

1935 **656 .225 (.43) & 656 .26 (.**

Rieles argentinos, diciembre, p. 320.

HELLMUT SIMONS. — **Servicio ferroviario a do cilio en Alemania.** (2 000 palabras & fig.)

In Italian.

Annali dei lavori pubblici. (Roma.)

1935 **625 .13 (.**

Annali dei lavori pubblici, novembre, p. 1003.

NAPOLI (A. di). — **Gli impianti idrici della diret sima** Bologna-Firenze. (4 700 parole & fig.)

La tecnica professionale. (Firenze.)

1936 **656 .211 (.**

La tecnica professionale, gennaio, p. 2.

TOSTI (L.). — **Le nuove stazioni** ferroviarie Firenze e Siena. (2 800 parole & fig.)

1936 **656 .261 (.**

La tecnica professionale, gennaio, p. 8.

PEDEMONTI. — **Carro trasportatore stradale a ruote tipo F.S.** (2 200 parole & fig.)

936 **621 .335 (.45)**
ecnica professionale, febbraio, p. 25.
LENA. — **I motori di trazione** no 32-200, 42-200 per locomotive a corrente continua 3 000 volt. 00 parole & fig.)

936 **621 .335 (.45)**
ecnica professionale, gennaio, p. 14; febbraio, p. 32.
organizzazione delle **riparazioni delle locomotive** riche a corrente continua nelle officine dei depo- F.S. (3 700 parole & fig.)

936 **656 .221.1**
tecnica professionale, febbraio, p. 38.
ORBELLINI (G.). — **Peso massimo dei treni** dipen- e dagli organi d'attacco. Doppie trazioni e spinte. 00 parole.)

ista tecnica delle ferrovie italiane. (Roma.)

936 **621 .133.2**
sta tecnica delle ferrovie italiane, 15 gennaio, p. 1.
ACCOMANI (L.) & VERZILLO (R.). — **Forni d'ac- per locomotive** un esperimento italiano. (3 000 le & fig.)

936 **625 .143.3 & 625 .151**
sta tecnica delle ferrovie italiane, 15 gennaio, p. 11.
EUCCI (G.). — Miglioramenti per difendere dalle ire e dalla **eccessiva usura** le rotaie che compon- i deviatoi. (3 000 parole & fig.)

936 **621 .335 (.45)**
sta tecnica delle ferrovie italiane, 15 gennaio, p. 21.
ANCHI (G.) & ELENA (S.). — Le **locomotive** riche a corrente continua a 3 000 volt — gruppo E. (4 000 parole & fig.)

936 **621 .133.3**
sta tecnica delle ferrovie italiane, 15 febbraio, p. 55.
ICHELUCCI (A.). — Corrosioni nei tubi bollitori ttone delle **caldaie di locomotive.** (2 200 parole &

936 **625 .5**
sta tecnica delle ferrovie italiane, 15 febbraio, p. 63.
ARMINI (P.). — Sul calcolo delle funi per **funico- aeree.** (6 500 parole & 5 tabelle.)

36 **55. (.45) & 625. (.45)**
sta tecnica delle ferrovie italiane, 15 febbraio, p. 86.
ADDALENA (L.). — La geologia applicata alla **uzione e manutenzione della rete ferroviaria** ita- . (5 700 parole.)

In Dutch.

De Ingenieur. (Den Haag.)

36 **62. (01**
ngenieur, N° 6, 7 Februari, p. B. 18.
OEHLICH (O. K.). — **Drukvastheid** vloeigrens **rensbelasting.** (2 400 woorden & fig.)

1936 **721 .9**
De Ingenieur, N° 6, 7 Februari, p. Bt. 7.
VAN DOOREN (J. C.). — Wat beteekent stralings- warmte voor den **betonbouw ?** (4 200 woorden & fig.)

1936 **62. (01 & 669**
De Ingenieur, N° 7, 14 Februari, p. E. 21.
DORGELO (H. B.) & NEETESON (P. A.). — **Röntgengrafisch onderzoek** van het vermoeidheidsverschijnsel bij metalen. (2 300 woorden & fig.)

Spoor- en Tramwegen. (Utrecht.)

1936 **625 .22 (.492)**
Spoor- en Tramwegen, N° 2, 21 Januari, p. 37.
DE MAN (A.). — **Vervoer buiten profiel.** (2 000 woorden.)

1936 **621 .132.1 (.44)**
Spoor- en Tramwegen, N° 3, 4 Februari, p. 53.
ROSENTHAL (G. A.). — **Stoomlocomotieven** van de **Nord.** (2 500 woorden & fig.)

1936 **625 .29**
Spoor- en Tramwegen, N° 3, 4 Februari, p. 58.
VAN DE LINDE (J. A.). — **Asbreukwagentje.** (600 woorden & fig.)

1936 **656 .225 (.492)**
Spoor- en Tramwegen, N° 4, 18 Februari, p. 75.
Reorganisatie van het **goederenvervoer** der Nederlandsche Spoorwegen. (1 300 woorden & fig.)

1936 **385. (09 (.92)**
Spoor- en Tramwegen, N° 4, 18 Februari, p. 84.
LUTZ (G.). — De **Staatsspoorwegen** in Zuid-Sumatra. (2 500 woorden & fig.) (Slot volgt.)

1936 **621 .132.8 (.492)**
Spoor- en Tramwegen, N° 4, 18 Februari, p. 87.
LABRIJN (P.). — De **stroomlijnlocomotief** Nr. 3804 der Nederlandsche Spoorwegen. (400 woorden & fig.)

In Polish.

(= 91.885)

Inżynier Kolejowy. (Warszawa).

1935 **625 .164 = 91 .885**
Inzynier Kolejowy, December, p. 351.
KALITYNSKI (Z.). — The rational use of snow-shields. (1 900 words and fig.)

1935 **625 .172 = 91 .885**
Inzynier Kolejowy, December, p. 355.
ROSIKON (A.). — Inspection of the track and repair work. (2 400 words and fig.)

1936 **385 .1 = 91 .885**
Inzynier Kolejowy, January, p. 2.
LOPUSZYNSKI (M.). — Budgeting and its applications to railway undertakings. (6 500 words and fig.)

1936 **621 .43 = 91 .885**
Inzynier Kolejowy, January, p. 8.
DOKTOROWICZ-HREBNICKI (Z.). — Railcars considered from a financial point of view. A study. (4 700 words.)

1936 **625 .113.3 = 91 .885**
Inzynier Kolejowy, January, p. 19.
JACYNA. — The fatigue of rails. (7 400 words.) (To be continued.)

1936 **385 .07.4 (.439) = 91 .885**
Inzynier Kolejowy, January, p. 38.
JACKOWSKI (K.). — Railway Museum at Budapest. (2 300 words and fig.)

In Portuguese.

Gazeta dos caminhos de ferro. (Lisboa).

1936 **388 (.469)**
Gazeta dos caminhos de ferro, N° 1156, 16 de fevereiro, p. 109.
SOUZA (F. de). — **As grandes comunicações de Lisboa.** Rêde de artérias radiais e transversais. (1 500 palavras.)

Revista das Estradas de ferro. (Rio de Janeiro.)

1935 **621 .132.8**
Revista das Estradas de ferro, N° 251, 30 de dezembro, p. 1109.
Dois novos typos de **automotrizes a vapor.** (800 palavras & fig.)

1936 **625 .251 (.8**
Revista das Estradas de ferro, N° 252, 15 de Janei p. 1129.
Uniformisação dos freios nas estradas do Bra (1 500 palavras.)

In Rumanian.

(= 599)

Revista tecniča C. F. R. (Bucuresti.)

1935 **625 .143.2 = 5**
Revista tecnica C. F. R., July-August, p. 202.
THEODORESCU (C. C.). — The acceptance of rai (4 800 words and fig.)

1935 **625 .173 = 5**
Revista tecnica C. F. R., July-August, p. 220.
IOSIPESCU (N.). — Track maintenance and ren wal by means of mechanical devices. (6 900 words a fig.)

1935 **621 .138.2 = 5**
Revista tecnica C. F. R., September-October, p. 255.
LUNEV (E.). — Deterioration of stocked coal. (5 0 words and fig.)

1935 **624 .3 (.47 + .498) = 5**
Revista tecnica C. F. R., September-October, p. 264.
MAXIM (I.). — Opening of temporary bridge ov the Dniester at Tighina. (3 000 words and fig.)

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MONTHLY BIBLIOGRAPHY OF RAILWAYS [1].

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016. 385. (02]

I. — BOOKS.

In French.

935 385. (01 (.66)
IUT (G.).
ıe expérience de réalisation ferroviaire africaine : hemin de fer franco-éthiopien de Djibouti à Addis-a.
ris, Comité de l'Afrique française, 21, rue Cassette. ɔchure, 75 pages. (Prix : 6 fr. français.)

35 621 .3
CHOD.
ɛmento d'électrotechnique. Tome IV. Applications électricité.
ris (6e), Dunod, 92, rue Bonaparte. 1 volume (14 2), 832 pages, 639 figures. (Prix : 136 fr. français.)

36 693
UC (E.) et CHENU (G.).
aux, ciments, plâtres.
ris et Liége, Librairie Polytechnique, Ch. Béranger. lume (12 × 18), 340 pages avec 67 figures. (Prix : . français.)

35 385 .517 (.44)
effort social des Grands Réseaux de chemins de n faveur de leur personnel.
ris, le Musée Social, 5, rue Las Cases. 1 volume, ɔages.

35 625 .2 & 669 .1
)LE (G.).
llégement des véhicules de chemins de fer et de ways.
ge, H. Vaillant-Carmanne, 4, place St-Michel. ɔchure, 20 pages et figures.

In German.

35 656 .225
VE.
e Eisenbahn-Güterabfertigung. Erster Teil : Abgungs- und Ladedienst.
rlin (W. 8.), Verkehrswissenschaftliche Lehrmitsellschaft m. b. H. bei der Deutschen Reichsbahn. nd, 43 Bildern. (Preis : 2.75 R.M.)

1936 385 (.43)
Deutscher-Reichsbahn-Kalender.
Leipzig, Konkordia-Verlag Goethestrasse, 6. 1 Band (16 × 25), 160 Seiten. (Preis : 3.20 R. M.)

1936 656
Eisenbahn und Kraftwagen.
Wien, Julius Springer. 1 Band, 277 Seiten. (Preis : 11 R.M. — In Österreich 18.70 S.)

1935 625 .1 (02
Elsners Taschenbuch für den bautechnischen Eisenbahndienst 1935.
Berlin (S. 42), Otto Elsner, Oranienstrasse, 140-142. 1 Band, 323 Seiten. (Preis : 2.50 R.M.)

1935 691. (02 & 721 .9 (0.2
EMPERGER.
Handbuch für Eisenbetonbau.
Berlin, Wilhelm Ernst und Sohn. 1 Band, 5 Lieferungen. (Preis jeder Lieferung : 6.60 R.M.)

1935 656 (.43)
HEIN (G.).
Kommentar zum Gesetz über die Beförderung von Personen zu Lande.
Berlin (W. 8.), Verkehrswissenschaftliche Lehrmittelgesellschaft bei der Deutschen Reichsbahn m. b. H. 1 Band, 158 Seiten. (Preis : 5.80 R.M.)

1935 [385. (09.3]
HOELTZEL (M.).
Aus der Frühzeit der Eisenbahnen. Mit einer Bibliographie.
Berlin, Julius Springer. 1 Band, 111 Seiten.

1936 691 & 721 .9
LÜHRS (J.).
Anleitung und Hilfstafeln zum Bemessen von Eisenbetonquerschnitten.
Berlin, Wilhelm Ernst und Sohn. 1 Band. (Preis : 4.80 R.M.)

1935 656 .21
MÜLLER (W.).
Neuere Methoden für die Betriebsuntersuchungen der Bahnanlagen.
Berlin, Julius Springer. 1 Band, 45 Seiten und Abbildungen.

(1) The numbers placed over the title of each book are those of the decimal classification proposed by the Railway Congress ɔintly with the Office Bibliographique International, of Brussels. (See « Bibliographical Decimal Classification as applied to way Science », by L. WEISSENBRUCH, in the number for November 1897, of the *Bulletin of the International Railway Congress*, 509).

1935 347 .763.4 (.44)

POLLACZEK (Dr. G.).

Grundzüge des Französischen Eisenbahn-Frachtrechts.
Wien, Allgemeiner Tarif-Anzeiger A. Freud. 1 Band, 111 Seiten.

1936 385 (.43)

SARTER (A.) und KITTEL (Th.).

Was jeder von der Deutschen Reichsbahn wissen muss.
Berlin (W. 8.), Verkehrswissenschaftliche Lehrmittelgesellschaft m. b. H. bei der Deutschen Reichsbahn. 1 Band. 68 Seiten.

1936 624

SCHAECHTERLE (K.).

Pfeiler und Widerlager von Brücken.
Berlin. Wilhelm Ernst und Sohn. 1 Band, 207 Seiten und 347 Textabbildungen. (Preis : 15.80 R.M.)

1936 385. (02 (.4)

Stationsverzeichnis der Eisenbahnen Europas (früher Dr. Kochs Stationsverzeichnis).
Berlin-Wilmersdorf, Barthol und Co, Mehlitzstrasse, 3. 1 Band, 1 047 Seiten.

1936 625 .233 (.43)

WÖLKE (H.).

Die elektrische Beleuchtung von Eisenbahnfahrzeugen bei der Deutschen Reichsbahn.
Berlin, Verkehrswissenschaftlichen Lehrmittelgesellschaft m. b. H. 1 Band. (Preis : 5.90 R.M.)

1936 [62. (06.4 (.43]

ZEITSCHRIFT DES VEREINES DEUTSCHER INGENIEURE.

Zur Technische Messe Leipzig 1936.
Berlin (N. W. 7), V-D-I Verlag. 1 Band, 47 Seiten und Abbildungen.

1935 621 .43

ZEMAN.

Zweitakt-Dieselmaschinen kleinerer und mittlerer Leistung.
Berlin, Julius Springer. 1 Band, 245 Seiten und 240 Abbildungen. (Preis : 20 R.M.)

In English.

1936 624 (.73) & 693 (.73)

AMERICAN RAILWAY ENGINEERING ASSOCIATION.

A compilation of the Specifications for the design and construction of : **I. Steel Railway Bridges** and **II : Concrete Railway Structures.** Abstracted from the 1929 Manual of recommended practice and supplements thereto.
Chicago, A. R. E. A., 59, East Van Buren Street. 1 pamphlet (6 × 9 inches) of 258 pages. (Price, with paper cover, postpaid : $ 1.00.)

1936

DIAMOND (E. L.), M. Sc. (England, A. M. Int. C. A. M. I. Mech. E.

The horse power of locomotives : its calculation measurement.
London, S.W.1. Reprint from the Railway Gaze 33, Tothill Street. (12 × 9 inches), 24 pages, ill (Price : 2 sh. 6 d.)

1936 385. (

DICKINSON (H. W.).

James Watt, craftsmen and engineer.
Cambridge, University Press. (Price : 10 sh. 6 net.)

1936 621

Diesel engine potentialities and possibilities in tra portation.
Lafayette, Ind. Purdue University, Engineering periment Station, Research Series No. 49. (Pri 25 c.)

1936 659 (.

Facts about British Railways.
London, S.W.1. The British Railways Press Off 35, Parliament Street. 32 pages and a map.

1936 624.

Final report of the 1st Congress for Bridge Structural Engineering.
Zürich. A. G. Gebr. Leeman and Company. (Pri 36 Swiss Francs.)

1936 62.

GIBBONS (C. H.).

Materials testing machines. Bulletin 75, Baldw Southwark Corp.
Philadelphia, Pa. Distributed by Baldwin-Southw Corp. (5 × 8 inches), 89 pages, diagrams, pho graphs.

1936 38 &

JACKMAN (W. T.).

Economic principles of transportation.
Toronto (Ontario). Published by the University Toronto Press (9 × 5 3/4 inches), 891 pages. (Pri $ 5.00.)

1936 621 .

LEWENZ (H. I).

Electric arc welding practice.
London, E. C. 4. Crosby Lockwood and Son, Ltd. S tioners' Hall Court. (8 3/4 × 5 1/2 inches), 126 pag illust. (Price : 8 sh. 6 d. net.)

1935

MARTIN (Arthur J.), M. Inst. C. E., M. Inst. W. M. Cons. E., F. G. S., F. R. San. I.

The work of the sanitary engineer.
London. Macdonald and Evans. (Price : 16 sh.)

1936 62. (01 & 72

MATTHEWS (John H.).

Analysis of framed structures.
New York City. McGraw-Hill Book Co., Inc.,(6 9 inches), 313 pages. (Price : $ 3.50.)

1935 65
ARSON (E. S.), D. Sc.
The application of statistical methods to industrial ndardisation and quality control.
London. The British Standards Institution. (Price: h. net.)

1936 62. (01 & 721 .9
LLIN (V. E.), C. B. E.
Engineering radiography.
London, G. Bell and Sons, Ltd., New York, The Engeers Book Shop, 168 E. 46th Street. (8×11 inches), pages, photographs, drawings and curves. (Price : 6.00.)

1935 625 .172
The Hallade track recorder and hints on the mainance of curves.
Delhi. Copies obtainable from The Manager of Pucations, Railway Board of India. 41 pages. (Price : 6 or 8 d.)

1936 69
QUHART and O'ROURKE.
Design of concrete structures.
McGraw-Hill Book Co. (6 × 9 inches), 556 pages, les and diagrams. (Price : $ 4.50.)

1936 69
UNG (C. R.).
Elementary structural problems in steel and timber.
New York, John Wiley and Sons; London, Chapman and Hall. (6 × 9 inches), 315 pages, tables and diagrams. (Price : $ 4.00.)

1936 624 .2
YU (H.).
Stresses in statically indeterminate structures.
Wuchang (China). Published by the National Wuhan University Press. (7 × 10 inches), 494 pages, tables and diagrams.

In Spanish.

1936 385 (.460)
DE LA TORRE (E.).
Anuario de Ferrocarriles españoles y tranvías. Año 1935.
Madrid, Enrique de la Torre, San Vicente Alta, 58, principal. 1 volumen (14 × 21 cm.), 424 páginas. (Precio : 7.50 pesetas.)

1936 624. (0 (.494)
MENDIZABAL (D.).
Nueva instrucción Suiza para el cálculo de construcciones metálicas.
Madrid, Revista de Obras Públicas. 1 folleto, 20 páginas y figuras.

[016. 385. (05]

II. — PERIODICALS.

In French.

Annales des Ponts et Chaussées (Paris).

1935 624 .6 & 721 .4
nales des ponts et chaussées, novembre, p. 754.
HUPNER. — Application des séries trigonométriques l'étude du **flambement des arcs.** (9 400 mots & fig.)

Annales des travaux publics de Belgique. (Bruxelles.)

1936 62. (01 & 621 .392
n. des travaux publics de Belgique, février, p. 61.
Essais de fatigue sur **assemblages soudés** en Allema-. (2 900 mots & fig.)

Arts et Métiers. (Paris.)

1936 669 .1
s et Métiers, février, p. 30.
ROSET (F.). — Note sur les **aciers inoxydables** leurs emplois (3 000 mots.)

Bulletin de la Société des ingénieurs civils de France. (Paris.)

1935 669
Bull. de la Soc. des ing. civ. de France, septembre-octobre, p. 609.
GALIBOURG (J.). — Compte rendu des travaux de la Section de la **Métallurgie.** (4 100 mots.)

1935 691
Bull. de la Soc. des ing. civ. de France, septembre-octobre, p. 643.
FREYSSINET. — Une révolution dans les techniques du **béton.** (8 600 mots & fig.)

Bulletin des transports internationaux par chemins de fer. (Berne.)

1936 313 .385 (.44)
Bull. des transp. intern. par ch. de fer, février, p. 149.
Statistique des chemins de fer français. (800 mots.)

Bulletin technique de la Suisse romande. (Vevey.)

1936 691
Bull. techn. de la Suisse romande, nº 5, 29 février, p. 53; nº 6, 14 mars, p. 61.
BOLOMEY (J.). — Durcissement des **bétons.** (3 500 mots, 4 tableaux & fig.)

Chronique des transports. (Paris.)

1936 **385 .113 (.493)**

Chronique des transports, nº 5, 10 mars, p. 6.

La **Société Nationale des chemins de fer belges** en 1934. (2 600 mots.)

Génie civil. (Paris.)

1936 **62. (01 & 691**

Génie civil, nº 2794, 29 février, p. 202.

LOSSIER (H.). — Les **fissures du béton armé.** (4 600 mots & fig.)

1936 **656**

Génie civil, nº 2794, 29 février, p. 212.

Le **rôle des transports** dans l'évolution économique et sociale. (1 200 mots.)

1936 **621 .43 (.44)**

Génie civil, nº 2795, 7 mars, p. 221.

DELANGHE (G.). — **L'autorail Dunlop-Fouga** à trucks articulés, montés sur roues à pneumatiques et sur roues élastiques. (4 200 mots & fig.)

1936 **656 .234 (.44)**

Génie civil, nº 2795, 7 mars, p. 235.

Les **nouveaux tarifs « voyageurs »** des grands réseaux français. (800 mots & fig.)

1936 **62. (01 & 669 .1**

Génie civil, nº 2796, 14 mars, p. 250.

DEJEAN (P.) & GERSZONOWICZ (S.). — Valeur de l'essai de choc simplifié pour mesurer la **fragilité des barres rondes en acier ordinaire.** (5 000 mots & fig.)

1936 **669 .1**

Génie civil, nº 2796, 14 mars, p. 259.

Recherches sur **l'hétérogénéité des lingots d'acier.** (2 300 mots.)

L'Allégement dans les transports. (Lucerne.)

1936 **625 .232 (.44) & 621 .392 (.44)**

L'Allégement dans les transports, mars-avril, p. 30.

LEROY (M.). — **Rame articulée légère** de construction soudée en alliages d'aluminium. (1 900 mots & fig.)

1936 **621 .43 (.493)**

L'Allégement dans les transports, mars-avril, p. 36.

VANDERPUTTE (E.). — L'organisation des **revisions des moteurs Diesel** des automotrices des Chemins de fer belges. (3 200 mots & fig.)

1936 **621 .43 (.44)**

L'Allégement dans les transports, mars-avril, p. 46.

JEANCARD (L.). — **Les autorails Diesel-électriques** des Chemins de fer de la Provence. (900 mots & fig.)

La Science et la Vie. (Paris.)

1936 **656 .225 (.43) & 656 .261 (.**

La Science et la Vie, mars, p. 249.

Des **wagons circulent dans les rues** des grandes vil (400 mots & fig.)

La Traction électrique. (Paris.)

1935 **625 .62 (.4**

La Traction Electrique, novembre-décembre, p. 113.

KNAFF (J.). — **Les nouvelles motrices à bogies** Tramways bruxellois. (3 200 mots & fig.)

1935 **621 .335 (.4**

La Traction Electrique, novembre-décembre, p. 119.

HANYK (J.). — **Les locomotives électriques d'expr** des Chemins de fer de l'Etat tchécoslovaque, Série 467.0, nos 04 et 05. (1 400 mots & fig.)

1935 **621 .33 (.4**

La Traction Electrique, novembre-décembre, p. 123.

PODOSKI (J.). — Etude économique de l'**électri cation du trafic de banlieue** du nœud ferroviaire Varsovie. (2 400 mots & fig.)

L'Économie internationale. (Paris.)

1936 **6**

L'Economie internationale, mars, p. 3.

Route et rail. Mesures récentes de coordination. (2 6 mots.)

Le Container. (Paris.)

1936 **656 .225 (.73) & 656 .261 (.7**

Le Container, janvier, p. 2.

Les **containers** aux Etats-Unis d'Amérique. (8 8 mots & fig.)

1936 **656 .225 & 656 .2**

Le Container, janvier, p. 28.

PRESSBURGER (S.). — Le **container** en 1935. (4 1 mots.)

Les Chemins de fer et les Tramways. (Paris

1936 **621 .132.8 (.43) & 621 .43 (.4**

Les Chemins de fer et les Tramways, mars, p. 55.

Locomotives et automotrices Diesel à transmissi hydraulique des Chemins de fer du Reich. (10 500 mo & fig.)

1936 **621 .**

Les Chemins de fer et les Tramways, mars, p. 63.

KEULEYAN (L.). — Véhicules à **transmission éle trique.** (3 200 mots & fig.)

1936 **625 .2**

Les Chemins de fer et les Tramways, mars, p. 67.

DESGARDES (E.). — **Voiture mixte** pour chemi de fer coloniaux. (4 400 mots & fig.)

1936 **621 .33 (.44)**

s Chemins de fer et les Tramways, mars, p. 72.
L'électrification de la ligne Paris-Luxembourg à Mas-Palaiseau et de l'embranchement de Bourg-la-Reine Sceaux-Robinson et leur incorporation au réseau étropolitain. (1 800 mots & fig.)

1936 **656 .254**

s Chemins de fer et les Tramways, mars, p. 75.
VIE (G.). — La répétition des signaux sur les locotives. (3 900 mots & fig.)

1936 **625 .5 (.493)**

s Chemins de fer et les Tramways, mars, p. 77.
Le funiculaire aérien de Santis (Suisse). (500 mots fig.)

Les transports modernes. (Paris.)

1935 **656 .1 (.44)**

s transports modernes, novembre-décembre, p. 40.
Les services automobiles des chemins de fer français 1934. (700 mots & fig.)

Industrie des voies ferrées et des transports automobiles. (Paris.)

1936 **385. (09 (.63)**

nd. des voies ferrées et des transp. autom., janvier, p. 6.
VENTE. — Une grande réussite française : Le Chemin de fer franco-éthiopien de Djibouti à Addis-Abeba. 900 mots, cartes & fig.)

L'Ingénieur-Constructeur. (Paris.)

1936 **624 .63 (.44)**

ngénieur-Constructeur, janvier-février, p. 3697.
LOUIS (R.). — Construction du pont en béton armé . 27.184 de la ligne Paris-Strasbourg. (3 700 mots ig.)

L'Ossature métallique. (Bruxelles.)

1936 **625 .23 (.493)**

ssature métallique, mars, p. 107.
BOURGEOIS (V.). — Les nouvelles voitures métalles de la Société Nationale des chemins de fer ges. (7 700 mots & fig.)

Revue générale des chemins de fer. (Paris.)

1936 **625 .212 (.44)**

ue générale des chemins de fer, mars, p. 173.
RTIGNAN. — Mesures prises par les réseaux fran- pour améliorer la qualité des bandages. (3 200 mots ig.)

1936 **625 .17**

Revue générale des chemins de fer, mars, p. 182.
GIRAL. — Nouveaux engins de levage et de roulement pour l'entretien des voies et appareils de voies. (4 300 mots & fig.)

1936 **385 .113 (.42)**

Revue générale des chemins de fer, mars, p. 187.
Les quatre grandes compagnies de chemins de fer britanniques en 1934. (6 100 mots & fig.)

1936 **625 .156**

Revue générale des chemins de fer, mars, p. 205.
Deux nouveaux types de heurtoirs en béton armé. (1 300 mots & fig.)

Revue politique et parlementaire. (Paris.)

1936 **385 (.43)**

Revue politique et parlementaire, mars, p. 450.
PESCHAUD (M.). — Le Reich et ses chemins de fer. (6 700 mots.)

Revue universelle des Mines. (Liége.)

1936 **721 .1**

Revue universelle des mines, mars, p. 94.
SZEPS (F.). — Etude des constructions reposant sur un sol élastique. (5 000 mots & fig.)

Traction nouvelle. (Paris.)

1936 **621 .43 (.44)**

Traction nouvelle, janvier-février, p. 2.
NICOLET (V.). — Les constructeurs français d'automotrices, leurs idées, leurs tendances actuelles. (6 500 mots & fig.)

1936 **621 .132.8 (.66) & 621 .43 (.66)**

Traction nouvelle, janvier-février, p. 15.
Les locomotives Diesel-électriques du Congo-Océan. (2 000 mots & fig.)

1936 **621 .43 (.493)**

Traction nouvelle, janvier-février, p. 20.
GHILAIN (P.). — Les automotrices en Belgique. (5 000 mots & fig.)

1936 **621 .43**

Traction nouvelle, janvier-février, p. 31.
Les coefficients caractéristiques des automotrices. (2 400 mots & fig.)

Transports. (Paris).

1936 **625 .14 & 625 .72**

Transports, mars, p. 97.

FLAMENT (H.). — La **voie ferrée.** Sa constitution. Son entretien. (3 600 mots & fig.)

1936 **656 .222.5 (.44)**

Transports, mars, p. 116.

La nouvelle formule des **indicateurs Chaix.** (2 800 mots & fig.)

In German.

Archiv für Eisenbahnwesen. (Berlin.)

1935/1936 **385 .517 (.43)**

Archiv für Eisenbahnwesen, November-Dezember, S. 1463; Januar-Februar, S. 113.

LAMBSDORFF & KUHATSCHECK. — Die **Arbeiterpensions- und Krankenkassen, die Angestellten-, Unfall- und Arbeitslosenversicherung** bei der Deutschen Reichsbahn im Jahr 1934. (19 000 Wörter.)

1935 **385 .113 (.494)**

Archiv für Eisenbahnwesen, November-Dezember, S. 1493.

NITSCHKE. — Die **Schweizerischen Bundesbahnen** in den Jahren 1932 bis 1934. (4 200 Wörter.)

1936 **385 (.3)**

Archiv für Eisenbahnwesen, Januar-Februar, S. 1.

KÜCHLER. — Die **Eisenbahnen der Erde.** (2 300 Wörter.)

1936 **656 .23 (0**

Archiv für Eisenbahnwesen, Januar-Februar, S. 69.

SPIESS. — Die besondere Bedeutung der Landwirtschaft für die Systematik der **Eisenbahntarife.** (8 000 Wörter.)

1936 **385 .113 (.493)**

Archiv für Eisenbahnwesen, Januar-Februar, S. 141.

VON RENESSE. — Die **Nationale Gesellschaft der belgischen Eisenbahnen** in den Jahren 1933 und 1934. (6 900 Wörter.)

1936 **385 .113 (.460)**

Archiv für Eisenbahnwesen, Januar-Februar, S. 163.

PAUSIN. — Die **vier grossen Spanischen Eisenbahngesellschaften** im Kalenderjahr 1934. (6 200 Wörter und 1 Karte.)

1936 **385 .517.1 (.52)**

Archiv für Eisenbahnwesen, Januar-Februar, S. 181.

OKADA (K.). — Die **Hilfs- und Pensionskasse** der Japanischen Reichsbahnverwaltung. (5 000 Wörter.)

Die Lokomotive. (Wien.)

1936 **621 .335 (.439**

Die Lokomotive, Februar, S. 21.

Die **elektrischen Lokomotiven** der königlichen ungarischen Staatsbahnen nach dem Kando' schen Phasenumformer-System. (10 800 Wörter und Abb.) (Fortsetzung folgt.)

1936 **621 .132.8 (.436**

Die Lokomotive, Februar, S. 37.

1 B 1 Gepäcks-Dampftriebwagen Reihe D. T. 1. d Österreichischen Bundesbahnen. (900 Wörter u Abb.)

Elektrische Bahnen. (Berlin.)

1936 **625 .26 (.4**

Elektrische Bahnen, Januar, S. 2.

DÖNGES (F. H.). — Die **Unterhaltung** der Berlin S.-Bahn-Wagen. (5 800 Wörter und Abb.)

1936 **621 .335 (.4**

Elektrische Bahnen, Januar, S. 11.

STEINBAUER (W.). — Die elektrischen Prüffeldeir richtungen des **Reichsbahn-Ausbesserungswerkes** Mü chen-Freimann. (5 800 Wörter und Abb.)

Glasers Annalen. (Berlin.)

1936 **621 .139 (.4**

Glasers Annalen, Heft 4, S. 31.

WAGNER (R. P.) & MUETHEN (H.). — Heimstof wirtschaft im deutschen **Lokomotivbau** unter beso derer Berücksichtigung der Lagerfrage. (6 000 Wört und Abb.)

1936 **621 .94 (.4**

Glasers Annalen, Heft 5, S. 39.

WILCKE. — Neuzeitliche **Werkzeugmaschinen** in d Eisenbahnwerkstätten. (7 500 Wörter und Abb.)

1936 **621 .87 (.43) & 656 .213 (.4**

Glasers Annalen, Heft 5, S. 49.

Die neue **Kohlenverladeanlage** in Bremen. (1 0 Wörter und Abb.)

Organ für die Fortschritte des Eisenbahnwesens (Berlin.)

1936 **625 .2**

Organ für die Fortschritte des Eisenbahnwesens, He 5, 1. März, S. 83.

SCHRÖDER (E.). — Neues auf dem Gebiet d **Druckluftbremsen.** (6 400 Wörter und Abb.)

1936 **621 .43 (.49**

Organ für die Fortschritte des Eisenbahnwesens, He 5, 1. März, S. 91.

LABRIJN (P.). — Neue **Dieselelektrische Kleinlok motiven** der Niederländischen Eisenbahnen. (2 0 Wörter und Abb.)

936 621 .132.8 (.62)
an für die Fortschritte des Eisenbahnwesens, Heft 5, 1. März, S. 98.
elenktriebwagen mit Dampfantrieb. (400 Wörter Abb.)

936 621 .134.1
an für die Fortschritte des Eisenbahnwesens, Heft 5, 1. März, S. 99.
ber das Schmieden der **Kropfachswellen.** (700 Wör- und Abb.)

936 621. 135. (01, 621 .135.4 & 625 .215
an für die Fortschritte des Eisenbahnwesens, Heft 6, 15. März, S. 101.
AUMANN (H.). — Die **Ermittlung der Massenträg-smomente** durch Schwingungsversuche. (12 700 ter, 10 Tafeln und Abb.)

tschrift des Vereines Deutscher Ingenieure. (Berlin.)

936 62. (01 & 669 .1
sch. des Ver. deutsch. Ing., Nr. 10, 7. März, S. 281.
EON (A.). — **Zugfestigkeit und Brinellhärte** von seisen. (2 200 Wörter.)

936 62. (01 & 669
sch. des Ver. deutsch. Ing., Nr. 10, 7. März, S. 283.
ASSERMANN (G.). — Plastizität von Metall-tallen und ihre Bedeutung für die **Werkstoffeigen-ften.** (4 200 Wörter und Abb.)

936 621 .132.3 (.47)
sch. des Ver. deutsch. Ing., Nr. 10, 7. März, S. 290.
UBINOFF (W.). — **Versuchsergebnisse** einer neuen ischen **Dampflokomotive.** (900 Wörter und Abb.)

936 536
sch. des Ver. deutsch. Ing., Nr. 11, 14. März, S. 306.
CHMIDT (E.). — Fortschritte der **wärmetechni-n Forschung.** (5 400 Wörter.)

Zeitschrift für das gesamte Eisenbahn-Sicherungswesen. (Berlin.)

936 656 .256.3
schrift für das gesamte Eisenbahn-Sicherungswesen, Nr. 3, 20. Februar, S. 25; Nr. 4, 10. März, S. 41.
RNDT (H.). — Die **Selbsttätigkeit im Eisenbahn-erungswesen.** (5 400 Wörter und Abb.) (Schluss .)

936 656 .254
schrift für das gesamte Eisenbahn-Sicherungswesen, Nr. 3, 20. Februar, S. 33.
AMPKE (O.). — **Optischer Zugschlussmelder.** 00 Wörter und Abb.)

1936 656 .25 (0 (.43)
Zeitschrift für das gesamte Eisenbahn-Sicherungswesen, Nr. 4, 10. März, S. 37.
WINZLER (W.). — Das **vereinfachte Signalbuch.** (4 000 Wörter und Abb.)

1936 656 .255
Zeitschrift für das gesamte Eisenbahn-Sicherungswesen, Nr. 4, 10. März, S. 45.
FROST (K.). — **Einrichtung von zeitweise eingleisigen Betriebsabschnitten** auf zweigleisigen Bahnen. (1 500 Wörter und Abb.)

Zeitung des Vereins Mitteleuropäischer Eisenbahnverwaltungen. (Berlin.)

1936 625 .244 (.43)
Zeitung des Vereins mitteleurop. Eisenbahnverw., Heft 8, 20. Februar, S. 163.
TASCHINGER. — **Kühlversuchsfahrten** der Deutschen Reichsbahn-Gesellschaft im Jahre 1935. (3 800 Wörter und Abb.)

1936 385 .517 (.43)
Zeitung des Vereins mitteleurop. Eisenbahnverw., Heft 9, 27. Februar, S. 183; Heft 10, 5. März, S. 208; Heft 11, 12. März, S. 226.
VON SCHAEWEN. — Die **Versorgung der Reichsbahnarbeiten,** ihre Entwicklung und ihr Aufbau. (15 300 Wörter und Abb.)

1936 385 (.494)
Zeitung des Vereins mitteleurop. Eisenbahnverw., Heft 10, 5. März, S. 203.
WANNER (F.). — Die oberste schweizerische **Verkehrspolitik** der letzten Jahre. (3 700 Wörter.)

1936 656 .225 (.485) & 656 .261 (.485)
Zeitung des Vereins mitteleurop. Eisenbahnverw., Heft 11, 12. März, S. 223.
LILLIENDAHL (A.). — Versuche mit **Kühlbehältern** in Schweden. (2 000 Wörter.)

1936 385 (.52)
Zeitung des Vereins mitteleurop. Eisenbahnverw., Heft 11, 12. März, S. 221.
Die **Japanischen Staatsbahnen** seit 1934 im Zeichen des Aufschwungs. (1 700 Wörter.)

1936 656
Zeitung des Vereins mitteleurop. Eisenbahnverw., Heft 12, 19. März, S. 243.
TREIBE. — **Zusammenarbeit** von Schiene und Kraftwagen. (2 600 Wörter.)

1936 385. (09.3 (.436)
Zeitung des Vereins mitteleurop. Eisenbahnverw., Heft 12, 19. März, S. 251.
FEILER (K.). — Zum hundertsten Jahrestag der Privilegserteilung für die **erste österreichische Dampfeisenbahn.** (2 000 Wörter und Abb.)

In English.

Annals, American Academy of Political and Social Science. (Philadelphia.)

1936 **336 & 351**

Annals, Amer. Acad. of Political and Social Science, January, p. 1.

Government finance in the modern economy. A general inquiry in the fields of public expenditures, revenues, and credit financial planning and administration, and financing of public works, social security, and war. (30 articles.) — Supplement : Rising prices and the consumer. (3 articles.)

Engineer. (London.)

1936 **621 .39 & 621 .9**

Engineer, No. 4178, February 7, p. 148.

ROBERTS (K. W. D.). — **The electric control of machine tools.** (4 500 words and fig.)

1936 **62. (064 (.42)**

Engineer, No. 4179, February 14, p. 171; No. 4180, February 21, p. 212; No. 4181, February 28, p. 240.

The British Industries Fair at Birmingham. (11 600 words and fig.) (To be continued.)

1936 **621 .94 (.42)**

Engineer, No. 4179, February 14, p. 176.

Dual control plain milling machine. (5 000 words and fig.)

1936 **621 .2 & 621 .31**

Engineer, No. 4179, February 14, p. 181; No. 4180, February 21, p. 207.

HELLSTROM (B.). — Recent practice in **hydro-electric power development.** (6 800 words and fig.)

1936 **62. (064 (.42)**

Engineer, No. 4179, February 14 (Supplement); No. 4180, February 21 (Supplement).

The British Industries Fair at Birmingham. — Descriptive supplement Nos. 1 and 2. (22 500 words and fig.)

1936 **621 .2 & 621 .31**

Engineer, No. 4179, February 14, p. 181.

HELLSTROM (B.). — Recent practice in **hydro-electric power development.** (3 300 words and fig.) (To be continued.)

1936 **624 .7 (.41)**

Engineer, No. 4180, February 21, p. 196; No. 4181, February 28, p. 221.

The Kincardine-on-Forth bridge. (3 500 words and fig.) (To be continued.)

1936 **621 .331 (.438)**

Engineer, No. 4180, February 21, p. 200.

3 300-volt rectifier sub-station equipment. (2 300 words and fig.)

1936 **621 .95 (.**

Engineer, No. 4180, February 21, p. 210.

A large horizontal **boring machine.** (500 words and fig.)

1936 **621 .**

The Metallurgist, p. 98, Supplement to the Engine February 28.

Spot-welding. (1 500 words.)

1936 **669**

The Metallurgist, p. 99, Supplement to the Engine February 28.

Flakes in steel forgings. (2 900 words.)

1936 **669**

The Metallurgist, p. 102, Supplement to the Engine February 28.

Iron-carbon-manganese alloys. (1 400 words and fig.)

1936 **669**

The Metallurgist, p. 104, Supplement to the Engine February 28.

Nickel-copper-iron alloys and their magnetic properties. (2 200 words and fig.)

1936 **621 .143 (.7**

The Metallurgist, p. 107, Supplement to the Engine February 28.

Fissures in railroad rails. (1 600 words.)

1936 **669**

The Metallurgist, p. 109, Supplement to the Engine February 28.

JONES (J. A.). — **The effect of additions of Nitrogen on the properties of high chromium-iron allo** (2 200 words and tables.)

Engineering. (London.)

1936 **656 .212.6 (.4**

Engineering, No. 3656, February 7, p. 146.

B. E. V. **electric bale-stacking trucks.** (1 200 wo and fig.)

1936 **6**

Engineering, No. 3656, February 7, p. 154.

TUPLIN (W. A.). — **Transient torsional vibratio** (3 100 words and fig.)

1936 **53. (064 (.4**

Engineering, No. 3656, February 7, p. 159.

The Physical Society's Exhibition. (5 000 words and fig.)

1936 **62. (064 (.4**

Engineering, No. 3657, February 14, p. 165; No. 3 February 21, p. 193; No. 3659, February 28, p. 2

The British Industries Fair at Birmingham. — I, III. (32 600 words and fig.)

1936 **621 .94 (.42)**

ngineering, No. 3657, February 14, p. 183.

Dual-control motor-driven milling machine. (1 000 ords and fig.)

1936 **621 .116**

ngineering, No. 3657, February 14, p. 192.

The wave-ring high-pressure pipe joint. (1 300 words id fig.)

1936 **621 .331 (.438)**

ngineering, No. 3658, February 21, p. 201.

2 000-kw., 3.3-kv. mercury rectifiers for the Polish tate Railways. (2 000 words and fig.)

1936 **624 .2**

ngineering, No. 3659, February 28, p. 233.

Rigid frame arch bridges. (2 000 words.)

1936 **621 .116 & 669 .1**

ngineering, No. 3659, February 28, p. 243.

Pipe flanges research. (Paper presented by H. J. OUGH, at the Institution of Mechanical Engineers, ebruary 21, 1936, Abridged.) (4 200 words and fig.)

1936 **621 .95 (.42)**

ngineering, No. 3659, February 28, p. 246.

Boring machine for locomotive cylinders. (700 words id fig.)

Engineering News-Record. (New York.)

1936 **388 (.73)**

ngineering News-Record, No. 6, February 6, p. 216.

MILLER (J. A.). — **Trends in city transit.** (2 000 ords and fig.)

1936 **624 .63 (.73)**

ngineering News-Record, No. 7, February 13, p. 244.

AUERBACH (A. B.). — **Cast-steel hinges for long ncrete rigid frame.** (900 words and fig.)

1936 **624 .62 (.73)**

ngineering News-Record, No. 7, February 13, p. 246.

Chrome-copper steel arch spans 1 080 ft. (1 000 ords and fig.)

1936 **621 .392 & 624 .2**

ngineering News-Record, No. 8, February 27, p. 310.

HOVEY (O. E.). — **Welded structure design for dy-mic loads.** (A method of determining endurance-nit unit stresses, main material sections and weld eas, with particular reference to bridge requirements. 300 words, 2 tables and fig.)

1936 **624. (0 (.73) & 669 (.73)**

ngineering News-Record, No. 8, February 27, p. 318.

JOHNSON (H. D.). — **Aluminum stringer failures** e to fatigue loading. (Smithfield Street bridge, ttsburgh.) (1 300 words and fig.)

Journal, Institution of Engineers, Australia. (Sydney, N. S. W.)

1936 **385 .1 (.941)**

Journal, Institution of Engineers, Australia, January, p. 15.

ELLIS (J. A.). — Railway progress in Western Australia, 1927-1935. (10 000 words, 2 tables and fig.)

Journal, Institution of Civil Engineers. (London.)

1936 **627 (.42)**

Journal, Institut. of Civil Engineers, February, p. 4.

KENNEDY (D.) & ALDINGTON (H. E.). — **Royal Docks approaches improvement,** London. (16 000 words and fig.)

1936 **625 .14 & 625 .15**

Journal, Institut. of Civil Engineers, February, p. 135.

BRIDGMAN (R.). — **Modern permanent-way design.** (4 800 words, tables and fig.)

1936 **725 .36 (.42)**

Journal, Institut. of Civil Engineers, March, p. 303.

HALLIDAY (J.). — The construction of a **reinforced concrete grain-warehouse** at Leith Docks. (7 800 words and fig.)

1936 **624 .2**

Journal, Institut. of Civil Engineers, March, p. 322.

PROCTER (A. N.). — **The stability of the compression flanges of through-bridge plate-girders.** (10 000 words and fig.)

1936 **62. (072 (.42)**

Journal, Institut. of Civil Engineers, March, p. 361.

Engineering Research. — The Institution Research Committee. — Joint Sub-Committee on earth-pressures. — Joint Sub-Committee on Special cements. — Work of the Fuel Research Station. — Research work in Engineering at Sheffield University, January 1936. — Notes on Research publications. (7 400 words.)

Journal, Institute of Transport.

1936 **656 .212.6**

Journal, Institute of Transport, February, p. 217.

The mechanisation of a **railway goods depot.** — **I. Cartage,** by E. FALCONER. (4 200 words and tables.) — **II. Barrowing,** by A. E. HAMMETT. (4 000 words.)

1936 **625 .17 (.42)**

Journal, Institute of Transport, February, p. 228.

TRAIN (J. C. L.). — Modern methods of **permanent way maintenance.** (18 000 words.)

1936 **656**

Journal, Institute of Transport, February, p. 247.

ARTHURTON (A. W.). — **Transport** in the Dominions. (3 800 words.)

London & North Eastern Railway Magazine. (London.)

1936 **621 .13 (093**
London and North Eastern Railway Magazine, February, p. 82.
MUSGRAVE (G. A.). — The history and evolution of the **steam locomotive.** (2 800 words and fig.)

1936 **656 .212.5 (.42)**
London and North Eastern Railway Magazine, February, p. 94.
HARPER (J. S.). — Hull inward **goods yard.** (1 300 words and fig.)

Modern Transport. (London.)

1936 **656 .1**
Modern Transport, No. 884, February 22, p. 3.
MACKINNON (L.). — **Organisation of road passenger transport.** — Administrative duties at Glasgow. (2 000 words and fig.)

1936 **656 .256 (.42) & 656 .258 (.42)**
Modern Transport, No. 884, February 22, p. 5.
Automatic colour light signalling on L. N. E. R. (3 700 words and fig.)

1936 **385 .113 (.42)**
Modern Transport, No. 885, February 29, p. 3.
Railway results for 1935. — No. 1. — An analysis of earnings. (1 500 words and fig.)

1936 **656 .253 (.42)**
Modern Transport, No. 885, February 29, p. 5.
Route signalling on L. P. T. B. railways. (1 900 words and fig.)

1936 **625 .232 (.42)**
Modern Transport, No. 885, February 29, p. 8.
New G. W. R. **main line rolling stock.** — Draughtless ventilation and larger windows. (1 000 words and fig.)

Railway Age. (New York.)

1936 **625 .244 (.73)**
Railway Age, No. 7, February 15, p. 272.
Pullman builds steel refrigerator. (1 700 words and fig.)

1936 **725 .45 (.73)**
Railway Age, No. 7, February 15, p. 275.
Steel car shop building moved from Chicago to Port Huron. (1 600 words and fig.)

1936 **621 .335 (.73)**
Railway Age, No. 7, February 15, p. 278.
Electric passenger locomotives. (3 500 words, 1 table and fig.)

1936 **625 .174 (.73) & 656 .29 (.73)**
Railway Age, No. 7, February 15, p. 287.
Blizzards drive highway traffic to the railroads (1 200 words and fig.)

1936 **625 .29 & 66**
Railway Age, No. 8, February 22, p. 303.
WOOLLEN (A. H.). — **Aluminum for railway rolling stock construction.** (4 800 words and fig.)

1936 **627 (.73) & 691 (.73)**
Railway Age, No. 8, February 22, p. 309.
CLAPP (W. F.). — North Atlantic Coast fight new **marine borer attack.** (2 500 words and fig.)

1936 **621 .13, 621 .33 & 621 .4**
Railway Age, No. 8, February 22, p. 312.
KERR (Ch.). — **Motive power for high-speed operation.** — A study outlining the conditions of speed train weight and grade which govern selection o locomotives. (3 500 words and fig.)

1936 **656 .214 (.73**
Railway Age, No. 8, February 22, p. 317.
Large savings claimed for Chicago terminal co-ordination. (2 000 words and fig.)

1936 **621 .43 (.73) & 656 .1 (.73**
Railway Age, No. 8, February 22, p. 321.
Norfolk Southern regains passengers. (1 400 word and fig.)

1936 **656 .211.5 (.73**
Railway Age, No. 9, February 29, p. 351.
Pennsylvania provides **modern mail-handling facilities** at New York. (4 600 words and fig.)

1936 **385. (074 (.73**
Railway Age, No. 9, February 29, p. 357.
Railroad research. (1 300 words.)

1936 **621 .13 & 621 .4**
Railway Age, No. 9, February 29, p. 358.
ALCOCK (G. W.). — Some observations on **old world transportation problems** (steam and diesel traction (4 500 words and fig.)

1936 **656 .258 (.73**
Railway Age, No. 9, February 29, p. 363.
Chesapeake and Ohio installs remote **interlocking** (1 200 words and fig.)

Railway Gazette. (London.)

1936 **385. (091 (.68**
Railway Gazette, No. 9, February 28, p. 393.
ARTHURTON (A. W.). — **Further impressions o overseas transport.** — V. Improved catering service on the South African Railways, and modernisation o main lines to cope with constantly increasing traffi (1 200 words.)

936 **625 .245 (.42)**
lway Gazette, No. 9, February 28, p. 396.
ew wagon stock for London transport. (1 100 ds and fig.)

1936 **621 .132.6 (.42) & 621 .392 (.42)**
lway Gazette, No. 9, February 28, p. 400.
Velding in locomotive construction. (1 200 words fig.)

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936 **625 .143.4**
lway Gazette, No. 10, March 6, p. 433.
liminating the rail joint. (1 600 words.)

---

936 **385. (091 (.68)**
lway Gazette, No. 10, March 6, p. 440.
RTHURTON (A. W.). — **Further impressions of rseas transport.** (South African Railways.) (1 200 ds.)

---

936 **625 .232 (.42)**
lway Gazette, No. 10, March 6, p. 441.
he new Cornish Riviera trains of the Great Western lway. (2 000 words and fig.)

---

936 **625 .143.4 (.73)**
lway Gazette, No. 10, March 6, p. 447.
ong welded rails. — An American railway to abolish joints. Precautions to ensure safety. (2 600 words fig.)

---

936 **656 .225 (.42)**
lway Gazette, No. 10, March 6, p. 453.
he design and manufacture of **containers.** (700 ds and fig.)

---

936 **385. (09.1 (.68)**
lway Gazette, No. 11, March 13, p. 508.
RTHURTON (A. W.). — **Further impressions of rseas transport.** — VII. A review of developments shipping and air transport facilities carried out by South African Railways. (1 200 words.)

---

936 **621 .132.3 (.43)**
lway Gazette, No. 11, March 13, p. 509.
ew German **three-cylinder 2-10-2 tank locomotives.** 00 words and fig.)

---

936 **385 .1 (.42) & 656 .2 (.42)**
lway Gazette, No. 11, March 13, p. 513.
ailway shareholdings in passenger road transport eat Britain). (1 600 words, tables and fig.)

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936 **656**
lway Gazette, No. 11, March 13, p. 519.
oad and rail co-ordination. (1 000 words and fig.)

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936 **621 .132.5 (.71)**
lway Gazette, No. 11, March 13, p. 521.
ew **2-8-2 locomotives** for Newfoundland. (600 ds and fig.)

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936 **621 .43 (.44) & 656 .222.1 (.44)**
lway Gazette, No. 11, March 13, p. 537.
notable French **railcar record.** (800 words.)

1936 **385 .1**
Railway Gazette, No. 12, March 20, p. 556.
Railway policy and other matters. — Some extracts from the Chairmen's speeches at the recent railway meetings. (2 800 words.)

1936 **624 .2 (.489)**
Railway Gazette, No. 12, March 20, p. 561.
The Storström **bridge.** (1 300 words and fig.)

1936 **625 .215 (.494)**
Railway Gazette, No. 12, March 20, p. 563.
Duplex bogies. (2 700 words and fig.)

1936 **621 .13 & 669 .1**
Railway Gazette, No. 12, March 20, p. 567.
Stainless steel in locomotive engineering. (2 000 words.)

1936 **624 .8 (.42)**
Railway Gazette, No. 12, March 20, p. 568.
A precast **reinforced concrete highway bridge.** (450 words and fig.)

1936 **621 .131.3**
Railway Gazette, No. 12, March 20, p. 574.
Locomotive testing. — Report of a lecture by Prof. Dr.-Ing. Felix Meineke to the German Circle in London. (1 800 words and fig.)

1936 **621 .43 & 621 .89**
Diesel Ry. Traction, p. 366, Supplt. to the Ry. Gazette, February 21.
GILL (H. C.). — The **economic lubrication** of high-speed and medium-speed engines for diesel traction. (2 800 words and fig.)

1936 **621 .43 (.47)**
Diesel Ry. Traction, p. 369, Supplt. to the Ry. Gazette, February 21.
Inauguration of **diesel traction** in Estonia. (200 words and fig.)

1936 **621 .335 & 621 .43**
Diesel Ry. Traction, p. 370, Supplt. to the Ry. Gazette, February 21.
An electrical engineer on Diesel traction. (600 words.)

1936 **621 .43 (.43)**
Diesel Ry. Traction, p. 371, Supplt. to the Ry. Gazette, February 21.
A new **horizontal engine.** (200 words and fig.)

1936 **621 .42 & 621 .8**
Diesel Ry. Traction, p. 372, Supplt. to the Ry. Gazette, February 21.
MIALL (S.). — **Transmissions** for diesel locomotives and railcars. (1 100 words and fig.)

1936 **621 .43 (.81)**
Diesel Ry. Traction, p. 374, Supplt. to the Ry. Gazette, February 21.
Railcars for the Mogyana Railway. (300 words and fig.)

1936 **621 .43 (.43)**
Diesel Ry. Traction, p. 376, Supplt. to the Ry. Gazette, February 21.
New **Deutz engine** for big railcars. (1 900 words and fig.)

1936 **621 .33 (.439)**
Electric Ry. Traction, p. 270, Supplt. to the Ry. Gazette, February 7.
LAJTHAY (E.). — **Electrified lines in Hungary.** (1 200 words and fig.)

1936 **621 .33 (.42)**
Electric Ry. Traction, p. 273, Supplt. to the Ry. Gazette, February 7.
Electrification of the Wirral lines, L. M. S. Ry. (300 words and fig.)

1936 **621 .33 & 656 .25**
Electric Ry. Traction, p. 274, Supplt. to the Ry. Gazette, February 7.
Electric traction and signalling. (4 300 words and fig.)

Railway Magazine. (London.)

1936 **656 .222.1 (.73)**
Railway Magazine, February, p. 85.
North American **railway speeds** in 1934. (3 000 words and tables.)

1936 **656 .211.5 (.42)**
Railway Magazine, February, p. 107.
Platform indicators on the Underground. (1 400 words and fig.)

South African Railways and Harbours Magazine. (Johannesburg.)

1936 **625 .214 (.68)**
South African Rys. and Harbours, February, p. 201.
A brief history of carriage and wagon **axlebox design** on the South African Railways. (1 200 words and fig.)

The Oil Engine. (London.)

1936 **621 .43 (.73)**
The Oil Engine, January, p. 271.
The highest-powered Diesel trains. Two 2 400 b. h. p. 10-car trains. Time of 1 048-mile journey to be reduced by 9 hours. (500 words and fig.)

1936 **621 .43**
The Oil Engine, January, p. 276.
Oil engine progress in 1935. (2 600 words and fig.)

1936 **621 .43**
The Oil Engine, January, p. 289.
Big strides in railway Diesel traction. (1 400 words and fig.)

1936 **621 .**
The Oil Engine, January, p. 291.
Standard specification for oil engines. (1 200 wo and fig.)

1936 **621 .**
The Oil Engine, January, p. 292.
Consolidation of oil engine design in 1935. (2 8 words.)

1936 **621 .43 (.4**
The Oil Engine, January, p. 300.
HEINZE (E. P. A.). — **New express railcar engin** (1 800 words and fig.)

1936 **621 .335 (.73) & 621 .43 (.7**
The Oil Engine, January, p. 304.
A standardized **1 800 h. p. American Diesel elect locomotive.** (900 words and fig.)

1936 **621 .43 (.8**
The Oil Engine, January, p. 305.
Streamlined railcar for the Argentine. (900 wo and fig.)

Transactions, American Society of Mechanical Engineers. (New York.)

1936 **62. (01 & 669**
Transactions, Amer. Soc. of Mech. Engineers, Februa p. 91.
CROSS (H. C.) & DAHLE (F. B.). — **Long-ti creep tests** of 18 Cr 8 Ni steel and 0.35 per cent carb steel. (2 800 words and fig.)

1936 **62. (01 & 669**
Transactions, Amer. Soc. of Mech. Engineers, Februa p. 97.
Short-time tensile tests at 850 F of the 0.35 per c carbon steel material K 20. (3 000 words, tables a fig.)

1936 **62. (01 & 669**
Transactions, Amer. Soc. of Mech. Engineers, Februa p. 103.
CROSS (H. C.) & DAHLE (F. B.). — High-tem rature properties of cast and wrought carbon ste from large valves for high-temperature service. (6 8 words and fig.)

In Spanish.

Anales de la Asociación de Antiguos Alumno del I. C. A. I. (Madrid.)

1936 **621**
Anales de la Asociación de Antiguos Alumnos del I. A. I., enero, p. 12, febrero, p. 72.
DE INZA Y TUDANCA (C.). — La medida del cuito de retorno en una **electrificación ferrovia** (5 500 palabras & fig.)

1936 **669 .1**

ıales de la Asociación de Antiguos Alumnos del I. C. A. I., enero, p. 21.

VAZQUEZ Y LOPEZ (J.). — **Defectos en el acero.** 300 palabras & fig.)

1936 **621 .335**

ıales de la Asociación de Antiguos Alumnos del I. C. A. I., febrero, p. 79.

VAZQUEZ LAZARO (P.). — El **control eléctrico en locomotoras y automotores** de corriente continua. 500 palabras & fig.) (Continuará.)

1936 **621 .392**

ıales de la Asociación de Antiguos Alumnos del I. C. A. I., febrero, p. 84.

ECHEVARRIA REZOLA (R. de). — Notas sobre **ldadura eléctrica** como elemento de construcción. oldadura del acero laminado y forjado.) (3 600 pa- ıras & fig.) (Continuará.)

Ferrocarriles y Tranvías. (Madrid.)

1936 **621 .132.8 (.73)**

rrocarriles y Tranvías, enero, p. 2.

ALONSO (M.). — « **Hiawatha** », **la nueva locomo- ra de vapor** construída por la American Locomotive mpany. (4 300 palabras & fig.)

1936 **385 .114**

rrocarriles y Tranvías, marzo, p. 66.

ALFONSO (E.). — Algunas consideraciones sobre **el ste del kilómetro-tren** en las grandes explotaciones rroviarios. (4 600 palabras.)

1936 **656**

rrocarriles y Tranvías, marzo, p. 72.

BARCELO (J.). — Algunas consideraciones sobre **lítica de transportes.** (7 200 palabras.)

1936 **621 .43 (.460)**

rrocarriles y Tranvías, marzo, p. 82.

Los nuevos **automotores rápidos** de Madrid-Zaragoza- icante. (3 200 palabras & fig.)

Ferroviarios. (Madrid)

1936 **621 .43 (.460)**

rroviarios, enero, p. 3.

Cómo funciona el **automotor** WE-401 de Madrid-Za- goza-Alicante. (1 500 palabras & fig.)

Hormigón y Acero. (Madrid.)

1936 **721 .9**

rmigón y Acero, enero, p. 1.

PROBST (E.). — Los problemas actuales en las **istrucciones de hormigón y de hormigón armado.** 900 palabras.)

1936 **624 .63 (.460)**

Hormigón y Acero, enero, p. 31.

ZAMORA-CORUÑA (F. C.). — El proyecto definitivo del **viaducto** sobre el Esla. (4 300 palabras & fig.)

Ingeniería y Construcción. (Madrid.)

1936 **624**

Ingeniería y Construcción, marzo, p. 113.

CASADO (C. F.). — Las **estructuras** durante 1935. (4 900 palabras & fig.)

1936 **698**

Ingeniería y Construcción, marzo, p. 128.

MARTOS (F.). — La **pintura por pulverización** como trabajo peligroso. (5 200 palabras & fig.)

Los Transportes. (Madrid.)

1936 **656 .23**

Los Transportes, Nº 417, 1º de febrero, p. 27.

MERINO (J.). — **Teorética del tráfico.** (2 000 palabras & fig.)

Revista de Obras Públicas. (Madrid.)

1936 **624. (0 (.494)**

Revista de Obras Públicas, Nº 3, 1º de febrero, p. 45.

MENDIZABAL (D.). — Nueva instrucción suiza para el cálculo de **construcciones metálicas.** (4 400 palabras.)

1936 **624 .32 (.460)**

Revista de Obras Públicas, Nº 3, 1º de febrero, p. 55.

MONEVA (F.). — Los trabajos de reparación de las pilas y estribos del **puente** sobre el río Matarraña (primer paso). (1 100 palabras & fig.)

1936 **625 .111 (.460)**

Revista de Obras Públicas, Nº 5, 1º de marzo, p. 91.

CANO RODRIGUEZ (J. M.). — Proyecto del **paso superior** del Paseo del Doctor Esquerdo (Madrid), sobre el ferrocarril de Madrid a Aragón. (2 300 palabras & fig.)

1936 **313 .385**

Revista de Obras Públicas, Nº 6, 15 de marzo, p. 114.

BOTIN (C.). — **Estadísticas ferroviarias.** (1 000 palabras & fig.)

1936 **656**

Revista de Obras Públicas, Nº 6, 15 de marzo, p. 116.

Consideración económico-política de la **coordinación de los transportes terrestres.** (4 200 palabras & fig.)

In Italian.

Annali dei lavori pubblici. (Roma.)

1936 **721 .1**

Annali dei lavori pubblici, gennaio, p. 21.

GUIDI (C. C.). — Il pericolo di slittamento nei terreni e la stabilità delle **opere di fondazione.** (6 600 parole & fig.)

1936 **624 .63 (.45)**

Annali dei lavori pubblici, gennaio, p. 40.

FRANCESCATTI (P.). — **Nuovi ponti** costruiti dall'A. A. S. S. nella Venezia Tridentina. Il ponte sull'Adige a S. Michele. (3 100 parole & fig.)

La tecnica professionale. (Firenze.)

1936 **656 .25 (0 (.45)**

La tecnica professionale, marzo, p. 49.

CALIENDO (G.). — I nuovi criteri di **segnalamento** introdotti con l'Ordine di Servizio N° 169-1935. (7 800 parole & fig.)

1936 **621 .33**

La tecnica professionale, marzo, p. 64.

CIOCIA (D.). — **Trazione trifase** a bassa frequenza e **trazione a corrente continua** alta tensione. (2 200 parole.)

L'Ingegnere. (Roma.)

1936 **624 .52 (.73)**

L'Ingegnere, febbraio, p. 59.

BOSA (L.). — Il **ponte** S. Francisco-Oakland. (5 000 parole & fig.)

1936 **691**

L'Ingegnere, febbraio, p. 75.

PERETTI (E.). — Il nuovo **cemento metallurgico** solfo-alluminoso o soprasolfatato. (5 000 parole & fig.)

1936 **625 .13**

L'Ingegnere, marzo, p. 121.

GIOVANNINI (M.). — Esame critico dei metodi di **calcolo per il rivestimento delle gallerie.** (14 000 parole & fig.)

Rivista tecnica delle ferrovie italiane. (Roma.)

1936 **621 .335 (.45)**

Rivista tecnica delle ferrovie ital., 15 marzo, p. 119.

MANCHI (G.). — Le **automotrici elettriche** a 3 000 volt-tipo E. 24. (5 200 parole & fig.)

1936 **621 .135.2 & 625 .212**

Rivista tecnica delle ferrovie ital., 15 marzo, p. 146.

DUTTO (G.). — Adozione di un acciaio a più alta resistenza nella fabbricazione dei **cerchioni per veicoli.** (4 600 parole.)

1936

Rivista tecnica delle ferrovie ital., 15 marzo, p.

BREAZZANO (A.). — Metodo italiano dei pr sottili (Breazzano) per la determinazione del p antimicotico delle **sostanze conservatrici del le** (5 700 parole & fig.)

Trasporti e lavori pubblici. (Roma.)

1936 **656 .1 (**

Trasporti e lavori pubblici, gennaio, p. 7.

MOTOR. — Il nuovo stato giuridico dell'automo in servizio del pubblico per le merci. (4 300 par

In Dutch.

De Ingenieur. (Den Haag.)

1936 **656 .253 (**

De Ingenieur, Nr. 9, 28 Februari, p. V. 11.

NIEWEG (H.). — De beteekenis en het gebruik **voornaamste seinen** op de Fransche Spoorwegen. (3 woorden & fig.)

1936 **62. (01 & 624**

De Ingenieur, Nr. 10, 6 Maart, p. Bt. 13.

DUYSTER (H. C.). — **Kuik bij boogbruggen** gewapend beton met laaggelegen rijvloor. (2 400 w den & fig.)

1936 **62**

De Ingenieur, Nr. 11, 13 Maart, p. B. 37.

KRUYS (F.). — Eenvoudige bepaling van **invlo lijnen in raamwerken en liggers** op meerdere st punten. (1 900 woorden & fig.)

Spoor- en Tramwegen. (Utrecht.)

1936

Spoor- en Tramwegen, Nr. 5, 3 Maart, p. 97.

Het z. g. « **Werkverkeer** ». (2 200 woorden.)

1936 **385 (.**

Spoor- en Tramwegen, Nr. 5, 3 Maart, p. 100.

LUTZ (G.). — De **Staatsspoorwegen in Zuid-Su tra** (Z. S. S.). (1 600 woorden & fig.)

1936 **656 .213 (.4**

Spoor- en Tramwegen, Nr. 5, 3 Maart, p. 102; Nr 17 Maart, p. 126.

BURGERS (W. L. C.) & STARING (M.). — exploitatie van de **kolenoverslaghaven** te Born. (8 woorden.) (Slot volgt.)

1936

Spoor- en Tramwegen, Nr. 6, 17 Maart, p. 123.

NAPP-ZINN (A. F.). — **Verkeerswetenschap.** (3 woorden.)

1936 **621 .33 (.4**

Spoor- en Tramwegen, Nr. 6, 17 Maart, p. 131.

De samenstelling der treinen op de nieuw te elec ficeeren baanvakken. (1 700 woorden & fig.)

In Polish.
(= 91.885)

Inżynier Kolejowy. (Warszawa).

1936 **385 .11 = 91 .885**
ynier Kolejowy, No. 2, February, p. 51.
OPUSZYNSKI (M.). — The railway working bud-. (6 000 words.)

1936 **625 .143.3 = 91 .885**
ynier Kolejowy, No. 2, February, p. 64.
ACYNA (W.). — Rail wear (concluded). (3 600 rds.)

1936 **625 .173 = 91 .885 & 665 .882 = 91 .885**
ynier Kolejowy, No. 2, February, p. 69.
MILLER (W.). — Reconditioning rails by autogen- welding. (6 300 words and fig.)

1936 **625 .4 (.438) = 91 .885**
ynier Kolejowy, No. 2, February, p. 78.
RAABE (E.). — The Zakopane aerial railway. (1 400 rds and fig.)

1936 **623 = 91 .885**
ynier Kolejowy, No. 3, March, p. 88.
GIEYSZTOR (J.). — The administrative organisa- n of railways from the point of view of national ence. (6 000 words.)

1936 **625. 143 = 91 .885 & 621 .392 = 91 .885**
ynier Kolejowy, No. 3, March, p. 93.
HUBER (M. T.). — The stability of welded rails straight track under temperature variations. (8 600 rds and fig.)

1936 **621 .392 (.438) = 91 .885**
& 624 .92 (.438) = 91 .885
ynier Kolejowy, No. 3, March, p. 112.
WILENKO (L.). — Welded assemblies in platform lters in the Krakow-Osabowa station. (1 600 words l fig.)

In Portuguese.

Gazeta dos caminhos de ferro. (Lisboa.)

1936 **385 .1**
Gazeta dos caminhos de ferro, N° 1157, 1 de março, p. 142.
AVELAR RUAS. — A crise nos caminhos de ferro. (1 100 palavras, 6 tabelas & fig.)

Revista das Estradas de ferro. (Rio de Janeiro.)

1936 **625 .251 (.81)**
Revista das Estradas de ferro, N° 254, 15 de fevereiro, p. 1158.
MUSSER (L. J.). — **Uniformisação dos freios** nas estradas de ferro do Brasil. (1 200 palavras.)

In Rumanian.
(= 599)

Revista tecniča C. F. R. (Bucuresti.)

1935 **624 .32 (.498) = 599**
Revista tecnica C. F. R., November-December, p. 348.
GHIMBASEANU (V.). — Construction of a provisional bridge over the Dniester, between Tighina and Tiraspol. (200 words and fig.)

In Czech.
(= 91.886)

Elektrotechnikíj Obzor. (Praha.)

1936 **621 .43 = 91 .986**
Elektrotechnickíj Obzor, 6 March, p. 153.
FINK (B.). — Working diagrams of oil-electric railcars. (2 300 words and fig.)

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[016. 385. (02]

I. — BOOKS.

In French.

1935 **625 .6 (06**

Cinquantenaire de l'Union Internationale de tramways, de chemins de fer d'intérêt local et de transports publics automobiles.

Bruxelles, Secrétariat Général de l'Union, 18, avenue de la Toison d'Or. 1 volume, 110 pages et figures.

1934 **385. (09.3 (.493)**

Cinquantième anniversaire (1884-1934) de la Société nationale des Chemins de fer Vicinaux de Belgique.

Bruxelles, S. N. C. F. V., 42, rue de la Science. 1 volume, 116 pages, figures et photographies.

1936 **669**

JILLET (L.).

Les métaux légers et leurs alliages : aluminium, magnésium, glucinium, métaux alcalins et alcalino-terreux.

Paris, Dunod. 1 volume (16 × 25), 409 pages et 267 figures. (Prix : 130 fr. français.)

1936 **691 & 721 .9**

JPELLAN (G.).

Le béton armé : Calcul rapide et précis des sections.

Paris, Dunod, 92, rue Bonaparte. 1 volume (16 × 25), 3 pages, 7 planches et 11 figures. (Prix : 48 fr. français.)

1936 **614 .8 & 656 .25**

AQUES (V.).

Les conditions de sécurité sur rail et sur route (2e édition).

Bruxelles, Association pour la défense du rail, 23, place Saint-Géry. 32 pages.

1936 **621 .8**

CRIGNON (J.).

Théorie et technologie des engrenages.

Paris, Dunod. 1 volume (16 × 25), 78 pages et 47 figures. (Prix : 19 fr. français.)

1936 **385. (08 (.44)**

Rapports du Conseil d'Administration et de la Commission de vérification des comptes de la Compagnie du Chemin de fer de Paris à Orléans. Assemblées générales des actionnaires du mardi 31 mars 1936.

Paris, Compagnie du P. O., 1 volume, 87 pages et tableaux.

1936 **669**

SIEBEL (E.).

Le façonnage des métaux par déformation plastique.

Paris et Liége, Librairie Polytechnique Ch. Béranger. 1 volume (16 × 25), 258 pages, 195 figures et 1 planche hors texte. (Prix : 70 fr. français.)

1936 **385 .57**

SOLLIER (P.) et DRABS (J.).

La psychotechnique.

Bruxelles, Comité Central Industriel de Belgique, 33, rue Ducale, et Paris, Alcan F. 1 volume, 187 pages et 16 planches hors texte. (Prix : 35 fr. belges.)

1936 **53 & 62. (01**

TIMOSHENKO (S.).

Théorie de l'élasticité.

Paris et Liége, Ch. Béranger. 1 volume (16 × 25), 446 pages et 203 figures. (Prix : 130 fr. français.)

In German.

1936 **621 .392**

Anleitung zum Lichtbogenschweissen. — Teil I : Lehrblätter. Teil IIa : Ausführungsbeispiele.

Leipzig und Berlin, Teubner, B. G. 2 Band, von 23 und 52 Seiten. (Preis : Teil I, 1.25 R.M.; Teil IIa, 1.75 R.M.)

1936 **385 (.44)**

Die Entwicklung der französischen Eisenbahnen in den letzten 15 Jahren (1920 bis 1935) und die Massnahmen zur Hebung ihrer finanziellen Lage. Von einem französischen Eisenbahnfachmann (M. Mange). Sonderabdruck von « Archiv für Eisenbahnwesen », Jahrgang 1936, Heft 2.

Berlin (W. 9), Julius Springer. 1 Band, 48 Seiten.

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(1) The numbers placed over the title of each book are those of the decimal classification proposed by the Railway Congress conjointly with the Office Bibliographique International, of Brussels. (See « Bibliographical Decimal Classification as applied to Railway Science », by L. WEISSENBRUCH, in the number for November 1897, of the *Bulletin of the International Railway Congress*, p. 1509).

1935 **62. (01**

EGGERT (J.) und SCHIEBOLD (E.).
Ergebnisse der technischen Röntgenkune. Band V : Anwendungen der Durchstrahlungsverfahren in der Technik.
Leipzig, Akademische Verlagsgesellschaft m. b. H. 1 Band, 118 Abbildungen im Text. (Preis : 15 R.M.)

1935 **656 .234**

FÜLLES (Th.).
Die Eisenbahn-Personentariftheorien.
Köln, Glass Buchhandlung Heinrich Gonski. 1 Band, 91 Seiten.

1935 **621 .392**

HESSE (R.).
Elektroschweissung.
Prag, Elektrotechnicky Svaz Ceskoslovensky. 1 Band, 42 Seiten, 36 Abbildungen. (Preis : 15 kc.)

1935 **669 .1**

HOUDREMONT (E).
Einführung in die Sonderstahlkunde.
Berlin, Julius Springer. 1 Band, 566 Seiten, 138 Zahlentafeln und 577 Abbildungen. (Preis : 52.50 R.M.)

1936 **624 .2**

STRASSNER (A.)
Berechnung statisch unbestimmter Systeme.
Berlin (W. 9), Wilhelm Ernst und Sohn. 1 Band, 116 Seiten mit 127 Abbildungen.

1934 **744**

TOCHTERMANN (W.).
Das Maschinenzeichnen.
Berlin und Leipzig. Walter de Gruyter & Co. 1 Band, 130 Seiten und 58 Tafereelen. (Preis : 1.62 R.M.)

1936 **62. (02**

Uhlands Ingenieur-Kalender.
Leipzig, Alfred Kröner. 1 Band; 2 Teilen. (Preis : 5.40 R.M.)

1936 **62 & 385**

V. D. I. Jahrbuch 1936.
Berlin, V. D. I.-Verlag, G. m. b. H. 1 Band, 192 Seiten. (Preis : 3.50 R.M.)

1935 **669**

ZEERLEDER (A. von).
Technologie des Aluminiums und seiner Leichtlegierungen.
Leipzig, Akademische Verlagsgesellschaft m. b. H. 1 Band, 300 Seiten, 43 Zahlentafeln und 203 Abbildungen. (Preis : 14 R.M.)

In English.

1936 **62. (01 (06 (.73)**

AMERICAN SOCIETY FOR TESTING MATERIALS.
Proceedings of the thirty-eight annual meeting held at Detroit, Mich., June 24 to 28, 1935. Vol. 35. Part I. Committee reports, new and revised tentative standards. Tentative revisions of standards. Part. II. Technical papers.
Philadelphia, Pa. Published by the Association.

1936 **625 .13 (**

BELL (A. Morton).
Locomotives : Their construction, maintenance a operation. Vols. I and II.
London, Virtue and Company, Ltd. (Price : 37 sh. 6 net.)

1936 **6**

BLAKE (E. G.), M. R. S. I.
Practical hints on the installation of heating app ratus.
London, E. C. 4. Technical Press, Ltd., 5, Ave Mari lane. (Price : 2 sh. 6 d. net.)

1936 **6**

DEPARTMENT OF SCIENTIFIC AND INDUSTRIA RESEARCH.
Deterioration of structures of timber, metal and co crete exposed to the action of seawater. Fifteenth repo of the Committee of the Institution of Civil Enginee Being a general description of the experimental wo carried out by the Committee to date. Edited by S. DIXON & H. J. GROSE.
London, H. M. Stationery Office. (Price : 12 sh. 6 net.)

1936 **621 .1**

DIAMOND (E. L.), M. Sc.
The horse-power of locomotives : Its calculation a measurement.
London, S. W. 1. The Railway Gazette, 31, Toth Street. (Price : 2 sh. 6 d. net.)

1935 **621 .43 (**

DIESEL ENGINE MANUFACTURER'S ASSOCIATIO STANDARD PRACTICES.
New York, Printed and distributed by Diesel Pub cations; 192, Lexington Avenue (6 × 9 inches), 1 pages, diagrams, charts, tables. (Price : $ 2.00.)

1936 **6**

HENLY (A. T.).
Design problems of heating and ventilation.
London, Crosby Lockwood and Son Ltd. (Price : 42 net.)

1936 **662. (**

INTERNATIONAL RAILWAY FUEL ASSOCIATIO
Twenty-sixth annual proceedings, Sept. 18th and 19 1935.
Chicago, Ill. Offices of the Association.

1936 **62. (**

KEMPE'S ENGINEER'S YEAR-BOOK, 1935.
London, W. C. 2. Morgan Brothers (Publishers) Lt 28, Essex Street, Strand. (7 1/4 × 4 3/4 × 3 inche 2 641 pages, illustr. (Price : 31 sh. 6 d.)

1936 **62. (01 & 621 .3**

LAMSON (Joseph Voris).
Contact-line wear control on heavy electric tracti systems.
Seattle (U. S. A.). University of Washington. Bul tin No. 82 of the Engineering Experiment Station. pages. (Price : 40 cents net.)

1936 621 .133.7
ATTHEWS (F. J.), B. Sc. (Hons).
Boiler feed water transport.
London. Hutchinson's Scientific and Technical Publi-tions. (Price : 12 sh. 6 d.)

1935 016 .669
Metals and alloys. Cumulate index of metallurgical ostracts published in vols. 3-5, January 1932 — Decem-r 1934, Metal and alloys.
New York. Reinhold Publishing Co. (6 × 11 inches), 2 pages. (Price : $ 10.00.)

1936 385 .1
NEWLANDS (Alex.), formerly Chief Engineer, L. M. S. Ry., and former Engineer of the Highland Ry.
The British Railways.
London. Longmans, Green & Co. Ltd., 39, Paternoster ow ,E. C. 4 (8 7/8 × 5 3/4 inches), 134 pages. (Price : sh. 6 d. net.)

1936 621 .43
Oil engines for road, rail and air transport.
London E. C. 1. The Temple Press Ltd. 5-15, Rosebery venue. 240 pages. (Price : 5 sh. net.)

1936 33
Problems of organized labor (A series of 29 papers aling with the labor supply, industrial and govern-ental relations, and labor organization).
Philadelphia, Pa. The American Academy of Political d Social Science. 3457, Walnut Street. Issue of the nals for March 1936. 258 pages.

1935 669
OSENHAIN (W.).
Introduction to the study of physical metallurgy. vised by J. L. HAUGHTON.
New York. D. Van Nostrand Co. (5 × 9 inches), 368 ges, illus., diagram, charts. (Price : $ 8.00.)

1936 01
SPRATT (H. P.).
Libraries for scientific research in Europe and Amer-ica.
London. Grafton and Company. (Price : 10 sh. 6 d. net.)

1936 656. (02
THE WORLD'S CARRIERS YEAR BOOK AND DIARY, 1936.
London, E. C. 4. The Bangor House, 68 & 69, Shoe Lane. (Price : 10 sh. 6 d. net.)

1936 385. (09 (.73)
WITHINGTON (Sidney).
The first twenty years of railroads in Connecticut.
New Haven, Connecticut, U. S. A. Yale University Press. Published for the Tercentenary Commission of the State of Connecticut. (9 × 6 inches), 32 pages + 2 inset plates and map. (Price : 25 cents.)

In Spanish.

1935 691
MORAL (F.).
Hormigón armado.
Madrid, Gráfica Administrativa, Rodriguez Sampedro, 32. 1 volumen, 240 páginas, 161 figuras y láminas. (Precio : 30 pesetas.)

In Italian.

1936 621 .43
OPATOWSKI (I.).
La perdita di velocità delle automotrici ferroviarie durante il cambiamento di marcia.
Milano, Francesco Vallardi, via Ausonio, 22. 1 opúscolo, 4 pagine.

[016. 385. (05]

II. — PERIODICALS.

In French.

Annales des ponts et chaussées. (Paris.)

1936 624 .8
nales des ponts et chaussées, janvier, p. 28.
CHERRE (V.). — Conditions d'établissement et bases s études des **ponts mobiles.** (14 400 mots & fig.)

1936 624 .5
nales des ponts et chaussées, février, p. 145.
MAGNIEN & COQUAND. — Etude sur le culotage s câbles pour **ponts suspendus.** (7 000 mots & fig.)

1936 625 .13 (.42)
nales des ponts et chaussées, février, p. 172.
GONON. — Le **tunnel** sous la Mersey, à Liverpool. 200 mots & fig.)

Bulletin de la Société d'encouragement pour l'industrie nationale. (Paris.)

1936 621 .132.8 (.44)
Bull. de la Sté d'encouragement pour l'ind. nat., février, p. 129.
SAUVAGE (E.). — **Train aérodynamique** de la Compagnie des chemins de fer de Paris à Lyon et à la Méditerranée. (800 mots.)

Bulletin de la Société des ingénieurs civils de France. (Paris.)

1935 621 .43
Bull. de la Sté des ing. civ. de France, novembre-décembre, p. 723.
VERON (M.). — Etude analytique des **variations de la température dans une paroi dont les deux faces sont soumises à des régimes périodiques de chauffage et de**

refroidissement. Application aux moteurs « à explosion » dont les culasses subissent des cycles thermiques de grande fréquence. Conséquences visant l'auto-allumage. Influence très secondaire des propriétés de masse. Influence très marquée des propriétés de surface. (34 000 mots, 6 tableaux & fig.)

1936 **621 .43**

Bull. de la Sté des ing. civ. de France, P. V. du 27 mars, p. 112.

FIEUX. — L'application de l'**embrayage automatique** à l'automotrice de grande puissance. (1 700 mots.)

Bulletin de l'Union internationale des chemins de fer. (Paris.)

1936 **385.** (09 (.489)

Bull. de l'Union intern. des ch. de fer, mars-avril, p. 81.

Les **Chemins de fer de l'Etat danois.** (10 000 mots.)

1936 **385 .113 (.3)**

Bull. de l'Union intern. des ch. de fer, mars-avril, p. 112.

Comparaison des **recettes et dépenses d'exploitation** des chemins de fer pour les années 1929 à 1935. (1 500 mots, tableaux & graphiques.)

1936 **385 .113 (.47.43)**

Bull. de l'Union intern. des ch. de fer, mars-avril, p. 121.

Les **Chemins de fer de Lettonie** pendant l'exercice 1934-1935. (1 300 mots.)

Bulletin des transports internationaux par chemins de fer. (Berne.)

1936 **385 .63 (.4)**

Bull. des transp. intern. par ch. de fer, mars, p. 163.

SCHMID (E.). — La **situation juridique des Etats de transit**, telle qu'elle résulte des Dispositions transitoires du protocole final de la C. I. M. du 23 octobre 1924. (1 500 mots.)

1936 **313 .385 (.485)**

Bull. des transp. intern. par ch. de fer, mars, p. 189.

Les **Chemins de fer suédois** en 1933 et 1934. (1 500 mots.)

1936 **313 .385 (.497.1)**

Bull. des transp. intern. par ch. de fer, avril, p. 225.

Les **Chemins de fer du Royaume yougoslave** pendant l'exercice 1934. (600 mots.)

Bulletin technique de la Suisse romande. (Vevey.)

1936 **62.** (01 & **691**

Bull. techn. de la Suisse romande, n° 7, 28 mars, p. 73.

BOLOMEY (J.). — Granulation et prévision de la résistance probable des **bétons.** (2 400 mots & fig.) (A suivre.)

1936 **625 .111 (.494**

Bull. techn. de la Suisse romande, n° 8, 11 avril, p. 8

DARDEL (L. de). — **Suppression des passages** niveau de Liesberg. (1 400 mots & fig.)

1936 **62.** (01 & 69

Bull. techn. de la Suisse romande, n° 8, 11 avril, p. 8

BOLOMEY (J.). — Granulation et prévision de résistance probable des **bétons.** (1 500 mots.)

Bulletin technique de l'Union professionnelle d Inspecteurs techniques et des chefs de sectio des chemins de fer belges. (Bruxelles.)

1936 **625 .144**

Bull. techn. de l'Union profes. des Inspecteurs techn. des Chefs de section des ch. de fer belges, 15 mai p. 1.

DE VOS (P.). — Vérification du tracé des **raccor paraboliques.** (1 200 mots et fig.)

1936 **625 .14 (09 (.49**

Bull. techn. de l'Union profes. des Inspecteurs techn. des Chefs de section des ch. de fer belges, 15 mai p. 23.

L'historique de la voie ferrée belge. (2 500 mots.)

Chronique des transports. (Paris.)

1936 **385 .113 (.4**

Chronique des transports, N° 6, 25 mars, p. 2.

Le **réseau de l'Etat français** en 1934. (2 500 mots.)

1936 **385 .113 (.4**

Chronique des transports, N° 7, 10 avril, p. 2.

Les **Chemins de fer allemands** en 1935. (4 200 mot

Electricité. (Paris.)

1936 **621 .**

Electricité, mars, p. 98.

GULTZGOFF (W.). — Détermination de la **puissar des moteurs électriques.** (5 600 mots & fig.)

Génie civil. (Paris.)

1936 **625 .215 (.4**

Génie civil, n° 2797, 21 mars, p. 282.

Basculeur de wagons installé à la gare de Sai Georges-de-Commiers (Isère). (800 mots & fig.)

1936 **385.** (09 (.4

Génie civil, n° 2797, 21 mars, p. 284.

KANDAOUROFF (P.) & POHL (K.). — Le **program de perfectionnement** des chemins de fer soviétiques p 1936. (1 400 mots.)

1936 **621 .43**

énie civil, nº 2798, 28 mars, p. 308.

L'essai des combustibles pour moteurs Diesel. (700 ots & fig.)

1936 **62. (01 & 624 .2**

énie civil, nº 2800, 11 avril, p. 349.

NICOLSKY (V. A.). — L'effort tranchant réduit, ans les pièces de hauteur variable. (1 200 mots & fig.)

1936 **621 .43**

énie civil, nº 2800, 11 avril, p. 353.

L'injecteur-pompe, système Bellem, pour moteurs Die-l. (1 100 mots & fig.)

1936 **62. (01**

énie civil, nº 2801, 18 avril, p. 371.

REGNAULD (P.). — Compression et forgeage. (2 700 ots & fig.)

1936 **621 .43 (.44)**

énie civil, nº 2802, 25 avril, p 396.

POUSSET (P.). — Les automotrices Diesel-électriques es Chemins de fer de l'Anjou. (2 700 mots & fig.)

1936 **621 .43**

énie civil, nº 2802, 25 avril, p. 401.

DUMONT (A.). — La signalisation sonore des auto-uils. (1 900 mots & fig.)

1936 **385 .113 (.44)**

énie civil, nº 2802, 25 avril, p. 406.

PONDEVEAUX (L.). — La statistique des Chemins e fer français. (1 300 mots.)

1936 **693**

énie civil, nº 2803, 2 mai, p. 416.

VUILLEMIN (R.). — L'emploi des mélanges de ciment lumineux et de ciment de laitier, comme liants hydrau-ques à prise rapide. (2 300 mots & fig.)

1936 **669 .1**

énie civil, nº 2803, 2 mai, p. 428.

PORTEVIN (A.) & LEMOINE (R.). — Influence de ivers facteurs sur la graphitisation à la solidification es fontes. (700 mots & 3 tableaux.)

La Science et la Vie. (Paris.)

1936 **625 .23 (0**

a Science et la Vie, avril, p. 279.

MARCHAND (J.). — Rames articulées et réversibles. l 400 mots & fig.)

La Traction électrique. (Paris)

1936 **621 .332**

a Traction Electrique, janvier-février, p. 277.

OTTH (H.). — Un système de ligne de contact actuel-ement peu connu. (1 800 mots & fig.)

1936 **621 .335 (.437)**

La Traction Electrique, janvier-février, p. 281.

HANYK (J.). — Les locomotives électriques d'express des Chemins de fer de l'Etat tchécoslovaque, Série E 467.0, nos 04 et 05. (2 500 mots & fig.)

1936 **621 .33 (.438)**

La Traction Electrique, janvier-février, p. 287.

PODOSKI (J.). — Etude économique de l'électrification du trafic de banlieue du nœud ferroviaire de Varsovie. (5 000 mots & fig.)

Les Chemins de fer et les Tramways. (Paris.)

1936 **621 .132.3 (.44)**

Les Chemins de fer et les Tramways, janvier, p. 2.

Les locomotives Pacific transformées et les nouvelles locomotives 2-4-0 du P. O.-Midi. (4 400 mots & fig.)

1936 **621 .43 (.44)**

Les Chemins de fer et les Tramways, janvier, p. 7.

Automotrices Renault à grande vitesse. (4 500 mots & fig.)

1936 **621 .132.8 (.82) & 621 .43 (.82)**

Les Chemins de fer et les Tramways, janvier, p. 11.

Locomotive Diesel-électrique du Santa-Fé « the Super Chief » — 3 600 H. P. (5 400 mots & fig.)

1936 **621 .134.1**

Les Chemins de fer et les Tramways, janvier, p. 14.

La fabrication des essieux coudés pour locomotives. (800 mots.)

1936 **625 .3 (.44) & 625 .5 (.44)**

Les Chemins de fer et les Tramways, janvier, p. 16.

Note sur quelques chemins de fer à crémaillère en France. Les téléfériques et funiculaires. (3 900 mots.)

1936 **625 .142.3**

Les Chemins de fer et les Tramways, janvier, p. 19.

Traverse métallique pour rails à patin. (700 mots & fig.)

1936 **656 .225 & 656 .261**

Les Chemins de fer et les Tramways, janvier, p. 20.

Transports combinés rail et route. (1 400 mots & fig.)

1936 **621 .132.7 (.73) & 621 .133.1 (.73)**

Les Chemins de fer et les Tramways, avril, p. 80.

Locomotive de manœuvres à vapeur chauffée automatiquement au mazout. (3 500 mots & fig.)

1936 **621 .43 (.43)**

Les Chemins de fer et les Tramways, avril, p. 82.

KEULEYAN. — Les nouveaux trains automoteurs articulés à trois caisses de la Reichsbahn. (1 700 mots & fig.)

1936 **621 .335 (.43)**

Les Chemins de fer et les Tramways, avril, p. 83.

Automotrice panoramique de la Reichsbahn. (500 mots & fig.)

1936 **656 .254**

Les Chemins de fer et les Tramways, avril, p. 88.

VIÉ (G.). — La **répétition des signaux** sur les locomotives par le système à induction. (3 700 mots & fig.)

1936 **625 .251**

Les Chemins de fer et les Tramways, avril, p. 91.

DESGARDES (E.). — Calcul de la **distance que peut** parcourir un train avant son arrêt par freinage. (2 700 mots.)

1936 **625 .258**

Les Chemins de fer et les Tramways, avril, p. 93.

GLATIGNY. — Installation et fonctionnement des **freins de voie** dans les gares de triage. (3 600 mots & fig.)

1936 **625 .143.5**

Les Chemins de fer et les Tramways, avril, p. 97.

Fabrication d'une **selle d'appui pour rail.** (1 600 mots & fig.)

1936 **621 .33 (.44)**

Les Chemins de fer et les Tramways, avril, p. 100.

Le projet d'**électrification** de la ligne Narbonne-Port-Bou. (1 800 mots & fig.)

L'Industrie des voies ferrées et des transports automobiles. (Paris.)

1936 **625 .15 & 621 .392**

L'Ind. des voies ferrées et des transp. autom., février, p. 31.

BERGER (P.). — **Appareils de voie** en acier, à 14 % de manganèse, soudables par aluminothermie. (1 100 mots.)

L'Ossature métallique. (Bruxelles.)

1936 **621 .392 (.485) & 624 .63 (.485)**

L'Ossature métallique, avril, p. 169.

NILSSON (N. E. W.). — La technique moderne appliquée aux **ponts métalliques.** Les nouveaux ponts de Stockholm. (2 000 mots & fig.)

1936 **624 .62 (.68)**

L'Ossature métallique, avril, p. 180.

Le **pont-route** de Birchenough sur la Sabi (Rhodésie du Sud). (1 100 mots & fig.)

Revue générale des chemins de fer. (Paris.)

1936 **625 .244**

Revue générale des chemins de fer, avril, p. 232.

HEURTAULT. — Influence de la température et de l'humidité des parois sur le coefficient de transmission de la chaleur dans les **wagons isothermes et réfrigérants.** (5 300 mots & fig.)

1936 **656 .234 (.**

Revue générale des chemins de fer, avril, p. 245.

VERLOT (J. B.). — Le tarif à vitesse unique pour **transport des animaux vivants.** (2 700 mots.)

1936 **625 .17 (.**

Revue générale des chemins de fer, avril, p. 251.

LEVI (R.). — **Assainissement d'une tranchée** avec u lisation de palplanches métalliques. (1 500 mots & fi

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1936 **625 .13 (.**

Revue générale des chemins de fer, avril, p. 255.

CASSE. — **Renforcement des voûtes** d'un viaduc maçonnerie. (1 200 mots & fig.)

1936 **656 .254 (.**

Revue générale des chemins de fer, avril, p. 258.

Application de la T. S. F. à la commande à distan de machines de manœuvres. (2 200 mots.)

Revue universelle des mines. (Liége.)

1936 **624**

Revue universelle des mines, avril, p. 150.

MARTELEE (J.). — Mesure des déformations d'u **poutre fléchie.** (1 900 mots & fig.)

1936 **621. 1**

Revue universelle des mines, avril, p. 166.

RICHTER (H.). — La protection des chaudières co tre les **corrosions.** (1 700 mots & fig.)

Revue universelle des transports et des communications. (Paris.)

1936 **625 .14 (01 & 656 .2**

Revue universelle des transports et des communicatio janvier-février, p. 261.

CZYGAN. — Les effets des **grandes vitesses de c** culation des trains sur les résistances à la traction sur la superstructure. (2 500 mots & fig.)

1936 **621 .13**

Revue universelle des transports et des communicatio janvier-février, p. 265.

OGUREK (O.). — Considérations sur la **puissan limite** des locomotives à vapeur. (4 600 mots & fig.)

1936 **385 .57 (.43**

Revue universelle des transports et des communicatio janvier-février, p. 93.

MONTFORT (H. de). — Le **laboratoire de psych technique** des Chemins de fer polonais. (2 800 mots fig.)

Traction nouvelle. (Paris.)

1936 **621 .43 (.4**

Traction nouvelle, mars-avril, p. 38.

MONET (J.). — Les **services français d'automotric** au début de 1936. (7 800 mots & fig.)

1936 **621 .132.8 (.44) & 621 .43 (.44)**
action nouvelle, mars-avril, p. 52.
Le concours P. L. M. pour deux **locomotives Diesel** de 00 chevaux. (1 300 mots & fig.)

1936 **621 .43**
action nouvelle, mars-avril, p. 54.
DUMANOIS (P.). — Considérations sur **l'allumage ns les moteurs** à gazoil à allure rapide. (2 700 mots fig.)

1936 **621 .43**
action nouvelle, mars-avril, p. 63.
ANXIONNAZ (R.). — La **suralimentation des mo-rs Diesel.** (4 000 mots & fig.)

Transports. (Paris.)

1936 **625 .1 (.44)**
ansports, avril, p. 137.
OCHET. — Les **grands travaux** de la Compagnie ris-Lyon-Méditerranée à Lyon. (4 600 mots & fig.)

In German.

Die Lokomotive. (Wien.)

1936 **621 .132.1 (.42)**
Lokomotive, März, S. 41.
Die **neueren Lokomotiven** der London, Midland und ottischen Bahn. — II. (8 500 Wörter & Abb.) (Fort-zung folgt.)

1936 **621 .335 (.439)**
Lokomotive, April, S. 57.
Die **elektrischen Lokomotiven** der kgl. ung. Staats-nen nach dem Kando' schen Phasenumformer-Sys-n. II. (8 000 Wörter & Abb.)

Elektrische Bahnen. (Berlin.)

1936 **621 .33 (.43)**
ktrische Bahnen, Heft 2, Februar, S. 31.
VECHMANN (W.). — Der **elektrische Zugbetrieb** der tschen Reichsbahn im Jahre 1935. (2 900 Wörter.)

1936 **621 .33 & 625 .234**
ktrische Bahnen, Heft 2, Februar, S. 34.
RAUCH. — **Elektrische Zugheizung.** (12 000 Wörter, Tafel & Abb.)

1936 **621 .335 (.45)**
ktrische Bahnen, Heft 3, März, S. 55.
CHNEIDER (L.). — Die italienischen **3 000 V-ichstromlokomotiven** der Einheitsbauart. (7 200 Wör- & Abb.)

1936 **612 .33 (.494)**
Elektrische Bahnen, Heft 3, März, S. 66.
MARSCHALL (A.). — Die **electrischen Einrichtun-gen** der Emmental--Solothurn-Münster — und Burgdorf-Thun-Bahn. (2 400 Wörter & Abb.)

1936 **385 .114 & 621 .33**
Elektrische Bahnen, Heft 3, März, S. 73.
GANZ (W.). — Hilfstafeln zur Vereinfachung der **Zugkostenrechnung.** (2 200 Wörter & Abb.)

Glasers Annalen. (Berlin.)

1936 **621 .139 (.43)**
Glasers Annalen, Heft 6, 15. März, S. 59.
WAGNER (R. P.) & MUETHEN (H.). — **Heim-stoffwirtschaft** im deutschen Lokomotivbau unter be-sonderer Berücksichtigung der **Lagerfrage.** (8 800 Wör-ter & Abb.)

1936 **621 .131.3**
Glasers Annalen, Heft 7, 1. April, S. 71.
MEINEKE (F.). — Ausgleichvorrichtung für **Loko-motivprüfstände.** (900 Wörter & Abb.)

1936 **656 .222.5 (.73)**
Glasers Annalen, Heft 8, 15. April, S. 83.
WERNEKKE. — **Schnellzüge mit erhöhter Geschwin-digkeit** in den Vereinigten Staaten. (3 500 Wörter & Abb.)

1936 **621 .133.1 (.43) & 621 .43 (.43)**
Glasers Annalen, Heft 8, 15. April, S. 86.
GRAHL (de). — Zur **Treibstoff-Frage.** (2 900 Wörter & Abb.)

1936 **621 .335 (.43)**
Glasers Annalen, Heft 8, 15. April, S. 90.
Elektrische Schnellzuglokomotiven der Deutschen Reichsbahn. (400 Wörter & Abb.)

Organ für die Fortschritte des Eisenbahnwesens. (Berlin.)

1936 **621 .332 (.43)**
Organ für die Fortschritte des Eisenbahnwesens, Heft 7, 1. April, S. 21.
NIBLER. — Bau der **110 kV-Bahnstromfernleitung** Landshut-Treuchtlingen (Grönhart). (4 800 Wörter & Abb.)

1936 **625 .215**
Organ für die Fortschritte des Eisenbahnwesens, Heft 7, 1. April, S. 133.
DAUNER (W.) & HILLER (E.). — Der **Anlaufstoss bei Eisenbahnfahrzeugen.** (5 000 Wörter & Abb.)

1936 **621 .43 & 625 .234**
Organ für die Fortschritte des Eisenbahnwesens, Heft 7, 1. April, S. 139.
Belüftungsanlage für Triebwagen. (1 000 Wörter & Abb.)

1936 **625 .14 (01**
Organ für die Fortschritte des Eisenbahnwesens, Heft 8, 15. April, S. 148.
MEIER (H.). — Beitrag zur Frage der **Rahmensteifigkeit des Gleisrostes.** (4 100 Wörter & Abb.)

1936 **625 .14 (01**
Organ für die Fortschritte des Eisenbahnwesens, Heft 8, 15. April, S. 154.
CZITARY (E.). — Beitrag zur **Berechnung des Querschwellenoberbaues.** (2 900 Wörter, 5 Tafeln & Abb.)

1936 **385 (.43)**
Organ für die Fortschritte des Eisenbahnwesens, Heft 8, 15. April, S. 161.
Die **Deutsche Reichsbahn** im Jahre 1935. (1 500 Wörter.)

1936 **625 .1 (.55)**
Organ für die Fortschritte des Eisenbahnwesens, Heft 8, 15. April, S. 163.
Neue Eisenbahn in Persien. (700 Wörter & Abb.)

Zeitschrift des Vereines Deutscher Ingenieure. (Berlin.)

1936 **656 .2**
Zeitsch. des Ver. deutsch. Ing., Nr. 12, 21 März, S. 349.
LEIBBRAND (M.). — Fortschritt und Wirtschaftlichkeit im **Schienenverkehr.** (3 000 Wörter, 3 Tafeln & Abb.)

1936 **725 .32 (.43)**
Zeitsch. des Ver. deutsch. Ing., Nr. 12, 21 März, S. 354.
KERN (H.). — **Umladeanlage** im Verschiebebahnhof Nürnberg. (1 500 Wörter & Abb.)

1936 **656 .21**
Zeitsch. des Ver. deutsch. Ing., Nr. 12, 21 März, S. 357.
MULLER (G.). — **Bahnhofsvorplätze** und Kraftverkehr. (2 900 Wörter & Abb.)

1936 **621 .392**
Zeitsch. des Ver. deutsch. Ing., Nr. 14, 4. April, S. 419.
WILBERT (H.). — Die Stromrichtersteuerung bei **Punkt- und Nachtschweissung** (1 000 Wörter & Abb.)

1936 **62. (01 & 691**
Zeitsch. des Ver. deutsch. Ing., Nr. 14, 4. April, S. 431.
Wechselwirkung zwischen **Korrosion und statischer Zugbeanspruchung.** (700 Wörter & Abb.)

1936 **62. (01**
Zeitsch. des Ver. deutsch. Ing., Nr. 15, 11. April, S. 437.
FRIEDRICH (W.) & NOETHLING (W.). — Die Verhütung von Strahlenschädigungen bei **Werkstoffprüfungen** mit Mesothor und Radium. (2 400 Wörter, 2 Tafeln & Abb.)

1936 **624 .3 (.43)**
Zeitsch. des Ver. deutsch. Ing., Nr. 16, 18. April, S. 461.
TILS (R.). — **Die fünf neuen deutschen Rheinbrücken** bei Krefeld, Duisburg, Neuwied, Mascau und Speyer. (5 400 Wörter & Abb.)

1936 **625 .1**
Zeitsch. des Ver. deutsch. Ing., Nr. 16, 18. April, S.
KRISCH (A.). — Zeitliche Änderungen der **mechschen Eigenschaften walzneuer Schienen.** (600 Wö & Abb.)

Zeitschrift für das gesamte Eisenbahn-Sicherungswesen. (Berlin.)

1936 **656 .254 (.43) & 656 .256.3 (.**
Zeitschrift für das gesamte Eisenbahn-Sicherungswe Nr. 5, 10. April, S. 52.
ARNDT (H.). — Die Selbsttätigkeit im **Eisenbasicherungswesen.** (3 000 Wörter & Abb.)

1936 **625 .151 (.**
Zeitschrift für das gesamte Eisenbahn-Sicherungswe Nr. 5, 10. April, S. 57.
HERWIG & BUDDENBERG. — Die **Reichsbahnchen.** (1 200 Wörter & Abb.)

1936 **656 .**
Zeitschrift für das gesamte Eisenbahn-Sicherungswe Nr. 5, 10. April, S. 65.
GANSEN (T.). — Das **Ausfahrvorsignal mit Kr speicherantrieb.** (2 600 Wörter & Abb.)

1936 **656 .**
Zeitschrift für das gesamte Eisenbahn-Sicherungswe Nr. 5, 10. April. S. 69.
FROST (R.). — Erfahrungen mit **Lichttagessigna** (3 200 Wörter & Abb.)

Zeitung des Vereins mitteleuropäischer Eisenbahnverwaltungen. (Berlin.)

1936 **656 .254 (.**
Zeitung des Vereins mitteleurop. Eisenbahnverw., Nr. 26. März, S. 270.
Neue **Kennzeichnung der Wegübergänge** in Deut land. (900 Wörter & Abb.)

1936 **385. (09 (.**
Zeitung des Vereins mitteleurop. Eisenbahnverw., Nr. 26. März, S. 271.
Manschukuo und seine Eisenbahnen 1935. (1 600 W ter & Abb.)

1936 **625 .23 & 625**
Zeitung des Vereins mitteleurop. Eisenbahnverw., Nr. 26. März, S. 288.
DIEDRICH. — Betriebliche Ausnutzung und w schaftliche **Erhaltung der Personenwagen.** (3 200 W ter & Abb.)

1936 **625 .231 (.**
Zeitung des Vereins mitteleurop. Eisenbahnverw., Nr. 9. April, S. 303.
KOENIGS. — **Tarifpolitik — Verkehrspolitik.** (3 Wörter.)

1936 **656 (.43)**

itung des Vereins mitteleurop. Eisenbahnverw., Nr. 15, 9. April, S. 307.

WAGEMANN (E.). — Die **Motorisierung des Strasnverkehrs und die Eisenbahnen.** (3 200 Wörter.)

1936 **656 .2**

itung des Vereins mitteleurop. Eisenbahnverw., Nr. 16, 16. April, S. 323.

MULLER (W.). — Die **Grundlagen des Eisenbahntriebes** und der technische Fortschritt. (4 500 Wör-r.)

1936 **656 .234 (.44)**

itung des Vereins mitteleurop. Eisenbahnverw., Nr. 16, 16. April, S. 328.

HEUBEL. — Zur **neugestaltung des französischen Eibahn-Personentarifs.** (1 400 Wörter.)

1936 **621 .116 (.43)**

itung des Vereins mitteleurop. Eisenbahnverw., Nr. 16, 16. April, S. 330.

Bemerkungen zu den **neuen Dampfkesselvorschriften** r Deutschen Reichsbahn. (1 300 Wörter.)

1936 **656 .1 (.43)**

itung des Vereins mitteleurop. Eisenbahnverw., Nr. 17, 23. April, S. 337.

von BECK (E.). — Die Durchführung des neuen deuthen Gesetzes über den **Güterfernverkehr mit Kraftrzeugen.** (10 000 Wörter.)

1936 **388 (.42) & 625 .4 (.42)**

itung des Vereins mitteleurop. Eisenbahnverw., Nr. 18, 30. April, S. 357.

GRETSCH (R.). — Das **Londoner Verkehrsamt** seit nem Bestehen und die Planungen der nächsten Jahre. 300 Wörter & Abb.) (Schluss folgt.)

1936 **385 (.47)**

itung des Vereins mitteleurop. Eisenbahnverw., Nr. 18, 30. April, S. 366.

SALLER. — Das **Eisenbahnverkehrswesen** der Sowjetion und die Stachanowbewegung. (2 000 Wörter.)

In English.

Bulletin, American Railway Engineering Association. (Chicago, Ill.)

1936 **656 .21 (.73)**

ll., Amer. Ry. Engineering Asson, January, p. 307.

Report of Committee on **yards and terminals.** — vision of manual. — Coal transfer terminals. — ales used in railway service. — Specifications for the nufacture and installation of four-section knife-edge lway track scales. — Specifications for the manuture and installation of motor truck, built-in, selftained and portable scales for railway service - 1936. Bibliography on subjects pertaining to yards and minals appearing in current periodicals. (42 000 words fig.)

1936 **621 .133.7 (.73) & 613 (.73)**

Bull., Amer. Ry. Engineering Asson, January, p. 383.

Report of Committee on **water service, fire protection and sanitation.** — Cause of and remedy for pitting and corrosion of locomotive boiler tubes and sheets. — Types of lime and soda ash equipment in treated water. — Water conditions affecting the extension of locomotive washout periods. (17 000 words & fig.)

1936 **625 .143 (.73)**

Bull., Amer. Ry. Engineering Asson, January, p. 421.

Report of Committee on **rail.** — Revision of manual (specifications). — Details of mill practice. — Rail failure statistics for 1934. — Transverse fissure statistics for 1934. — Rail lengths in excess of 39 feet. — Cause of the corrugation of rails. — Joint bars for 90-lb. RA-A and 100-lb. RE rail sections. (15 000 words, tables & fig.)

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656 .2 (.73)

1936 **625 .14 (.73), 625 .15 (.73) & 625 .16 (.73)**

Bull., Amer. Ry. Engineering Asson, January, p. 463.

Report of Committee on **track.** — Revision of manual. — Continuous welding of rail. — Plans and specifications for track tools. — Plans for switches, frogs, crossings, slip switches. — Tie plates for RE rail sections. (11 000 words & fig.)

1936 **625 .142 (.73) & 691 (.73)**

Bull., Amer. Ry. Engineering Asson, January, p. 509.

Report of Committee on **wood preservation.** — Service test records for treated ties. — Piling used for marine construction. — Destruction by termites and possible ways of prevention. — Effect of preservative in treated ties in track due to blowing off locomotives on line of road. (9 200 words, tables & fig.)

1936

Bull., Amer. Ry. Engineering Asson, January, p. 535.

Report of Committee on **economics of railway operation.** — Method for the determination of proper allowance for maintenance of way expense due to increased use and increased investment. — Cost of stopping and starting trains. — Effect of volume of traffic on railway operating expenses. — Operation with reduced number of main tracks. (9 000 words & tables.)

1936 **625 .141.1 (.73)**

Bull., Amer. Ry. Engineering Asson, February, p. 559.

Report of Committee on **ballast.** — Revision of manual. — Specification for stone ballast. — Cooperative tests on the cementing value of rock for railroad ballast. — Report on specification tests limits for stone ballast. — Specification for prepared blast furnace slag ballast. (7 800 words.)

1936 **625 .162 (.73), 625 .165 (.73) & 625 .259 (.73)**

Bull., Amer. Ry. Engineering Asson, February, p. 577.

Report of Committee on **highways.** — Revision of manual (Road and Signals). — Comparative merits of various types of grade crossing protection. — Difference in costs of highways of various types due to different weights and lengths of trucks. — Automatic pumping stations for use in connection with elimination of grade crossings. (3 300 words & fig.)

1936 **625 .237 (.73) & 657 (.73)**

Bull., Amer. Ry. Engineering Asson, February, p. 593.

Report of Committee on **records and accounts.** — Revision of manual office and drafting room practices. — Maintenance of way accounts and statistical requirements. — Construction reports and records. — Property records of railways with respect to valuation, accounting, depreciation and other requirements. — Changes or revisions in I. C. C. classification of accounts. (7 800 words & fig.)

1936 **69 (.73) & 72 (.73)**

Bull., Amer. Ry. Engineering Asson, February, p. 631.

Report of Committee on **masonry.** — Specifications and principles of design of plain and reinforced concrete. — Design in reinforced concrete of rigid-frame bridges without skew. — Progress in the science and art of concrete manufacture. — General specifications for substructures of railway structures. — Methods and practices of lining and relining tunnels. — Design of expansion joints involving masonry structures. (10 000 words & fig.)

1936 **691 (.73) & 693 (.73)**

Bull., Amer. Ry. Engineering Asson, February, p. 655.

Report of Committee on **waterproofing of railway structures.** — Principles governing waterproofing as dampproofing. — Waterproofing and dampproofing as applied to existing railway structures. — Specifications for bituminous emulsions. (5 200 words & fig.)

1936 **624**

Bull., Amer. Ry. Engineering Asson, February, p. 665.

Report of Committee on **wood bridges and trestles.** — Revision of Manual (specifications). — Simplification of grading rules and classification of timber for railway uses. Recommended relationships between the energy of hammer and the weight or mass of pile for proper pile driving. — Design of and specifications for washers, separators, cap-stringer straps and other wood bridge and trestle fastenings. — Etc. (22 000 words & fig.)

1936 **624 (.73) & 69 (.73)**

Bull., Amer. Ry. Engineering Asson, February, p. 729.

Supplemental report of Committee XV — **Iron and steel structures.** — Rules for rating existing structures. (2 600 words.)

1936 **625 .1 (06 (.73)**

Bull., Amer. Ry. Engineering Asson, March, p. 1.

Program, thirty-seventh Annual Convention and Year Book. — Numerical List of Members. — Alphabetical List of Members.

Commercial & Technical Journal. (Calcutta.)

1936 **656 .25**

Commercial & Technical Journal, January, p. 5.

PETER (Major L. H.). — Modern developments in **railway signalling.** (Paper read before the Institution of Electrical Engineers, London.) (8 600 words & fig.)

Engineer. (London.)

1936 **621 .2 & 621**

Engineer, No. 4182, March 6, p. 248; No. 4183, March p. 276.

HELLSTROM (B.). — Recent practice in **hyd electric power development.** (7 600 words, 5 tables fig.)

1936 **621**

Engineer, No. 4182, March 6, p. 257.

TRITTON (J. S.). — **Railcars** — their effect on pu transport and railway operation. (2 800 words.)

1936 **621 .43 (.**

Engineer, No. 4182, March 6, p. 265.

Oil-electric locomotives. (1 600 words & fig.)

1936 **621 .89 & 621**

Engineer, No. 4182, March 6, p. 268.

HAWKES (C. J.) & HARDY (G. F.). — Friction **piston rings.** (4 500 words, 5 tables & fig.)

1936 **621**

Engineer, No. 4183, March 13, p. 280.

Leipzig Technical Fair. (1 300 words & fig.) (To continued.)

1936 **62. (**

Engineer, No. 4183, March 13, p. 284.

A new high power electrical testing laboratory. (3 words & fig.)

1936 **621**

Engineer, No. 4183, March 13, p. 289.

Railcars. (2 600 words.)

1936 **621 .2 & 621**

Engineer, No. 4184, March 20, p. 305; No. 4186, April p. 370.

HELLSTROM (B.). — Recent practice in **hydro-el tric power development.** (6 200 words & fig.) (To continued.)

1936 **62. (064 (.**

Engineer, No. 4184, March 20, p. 305; No. 4185, March p. 332; No. 4186, April 3, p. 360.

Leipzig Technical Fair, Nos. II, III & IV. (4 700 wo & fig.) (To be continued.)

1936 **62. (01 & 6**

Engineer, No. 4184, March 24, p. 321.

BROWNSDON (H. W.). — **Metallic wear.** (2 600 wo & fig.)

1936 **621**

Engineer, No. 4185, March 27, p. 328.

AMERY (G.). — **Some compression ignition eng problems.** — No. II. (4 200 words.)

1936 **669.** (06 (.42)
ngineer, No. 4185, March 27, p. 330.
Institute of Metals. — No. II. **Nickel-silver alloys.** — ectrical resistance of copper and its alloys. — Age rdening of duralumin. — The influence of light on ectrode potential and corrosion. — A deep-drawing st for aluminium. (3 700 words.) (To be continued.)

1936 **621** .132.5 (.71)
ngineer, No. 4185, March 27, p. 338.
Locomotives for Newfoundland. (800 words & fig.)

1936 **385.** (072 (.42)
ngineer No. 4185, March 27, p. 345.
The new Institution of Automobile Engineers **research** boratories. (1 600 words & fig.)

1936 **669**
ngineer, No. 4185, March 27, p. 348.
Electric furnaces for bright annealing. (3 000 words fig.)

1936 **625** .232 (.44)
ngineer, No. 4185, March 27, p. 350.
ord Railway **three coach unit.** (650 words & fig.)

1936 **669.** (06 (.42)
ngineer, No. 4186, April 3, p. 359.
Institute of Metals. — No. III. **The effect of solder.** The hot tinning of copper. — Cuprous oxide inclu- ns and hot-tinned coatings on copper. Zinc coatings wire. (3 000 words.)

1936 **621** .9 (.42)
ngineer, No. 4186, April 3, p. 364.
Axle-box boring, facing and radiusing machine. (1 000 ords & fig.)

1936 **669** .1
ngineer, No. 4186, April 3, p. 372.
A continuous bright normalising furnace. (900 words fig.)

1936 **621** .31 & **621** .7
ngineer, No. 4187, April 10, p. 382; No. 4188, April 7, p. 406.
HELLSTROM (B). — Recent practice in **hydro-elec-** ic power development. (5 800 words & fig.)

1936 **621** .7 & **691**
ngineer, No. 4187, April 10, p. 394.
Deterioration of structures in sea water. (5 600 ords.)

1936 **621** .132.7 (.42) & **621** .43 (.42)
ngineer, No. 4187, April 10, p. 398.
New I. C. shunting locomotives. (1 600 words & fig.)

Engineering. (London.)

1936 **62.** (01
ngineering, No. 3660, March 6, p. 271.
The Arthuis **universal testing machine.** (800 words fig.)

1936 **62.** (064 (.43)
Engineering, No. 3661, March 13, p. 279.
The Leipzig Fair. (5 000 words & fig.)

1936 **621** .43 (.42)
Engineering, No. 3661, March 13, p. 284.
Performance of **300-h. p. diesel-electric locomotive.** (900 words & fig.)

1936 **621** .43 (.42)
Engineering, No. 3661, March 13, p. 290.
The future of **the railcar** in the British Isles. (2 000 words.)

1936 **62.** (01 & **669** .1
Engineering, No. 3661, March 13, p. 301.
DICKIE (H. A.). — **Embrittlement of steel** on prolonged heating. (900 words & fig.)

1936 **62.** (01 (.42)
Engineering, No. 3662, March 20, p. 303.
The **high-power testing laboratory** of the General Electric Company. (4 600 words & fig.)

1936 **62.** (01, **621** .89 & **669** .1
Engineering, No. 3662, March 20, p. 310.
Metallic wear in the presence of lubricants. (4 000 words & fig.)

1936 **62.** (064 (.43)
Engineering, No. 3663, March 27, p. 331.
The Leipzig Fair. (2 200 words & fig.) (To be continued.)

1936 **669.** (06 (.42)
Engineering, No. 3663, March 27, p. 333.
The Institute of Metals. — Deep-drawing test for aluminium. — Effect of solder on stressed materials. (5 400 words.)

1936 **621** .131.3
Engineering, No. 3663, March 27, p. 340.
Steam-locomotive tests. (1 700 words & fig.)

1936 **621** .9
Engineering, No. 3663, March 27, p. 342.
Colour control for machine tools. (1 600 words & fig.)

1936 **691**
Engineering, No. 3663, March 27, p. 352.
The deterioration of structure in sea water. (3 400 words.)

1936 **625** .13 (.42)
Engineering, No. 3663, March 27, p. 360.
The construction of the Mersey **tunnel.** (1 300 words.)

1936 **621** .138.2 (.73)
Engineering, No. 3664, April 3, p. 365.
Fuel- and ash-handling plant at the Cincinnati Union Railroad terminus. (3 200 words & fig.)

1936 **621 .9 (.42)**
Engineering, No. 3664, April 3, p. 369.
Boring and facing machine for axleboxes. (1 200 words.)

1936 **669 .1**
Engineering, No. 3664, April 3, p. 369.
Continuous **bright-annealing and normalising furnaces** for steel strip and sheets. (800 words.)

1936 **621 .39 & 669**
Engineering, No. 3664, April 3, p. 383.
GRIMSHAW (L. C.). — New method for **welding** together ferrous metals by application of heat and pressure. (Paper read before the American Institute of Mining and Metallurgical Engineers, New York, Feb. 19, 1936, abridged.) (4 700 words & fig.)

1936 **62. (064 (.43)**
Engineering, No. 3665, April 10, p. 388.
The Leipzig Technical Fair. (6 000 words & fig.)

1936 **697**
Engineering, No. 3666, April 17, p. 418.
BARDGETT (W. E.) & JAY (A. H.). — A new type of **room thermostat.** (700 words & fig.)

1936 **613, 625 .13 & 721 .1**
Engineering, No. 3666, April 17, p. 421.
Regulations for work carried out under **compressed air.** (1 300 words.)

1936 **62. (01 & 669 .1**
Engineering, No. 3666, April 17, p. 439.
HADFIELD (Sir Robert). — **Corrosion of iron and steel.** (Paper read before the Institution of Civil Engineers, April 7, 1936. Abridged.) (3 300 words.)

Engineering News-Record. (New York.)

1936 **721. (.73) & 725 .4 (.73)**
Engineering News-Record, No. 10, March 5, p. 337.
Enclosed acreage. (3 400 words & fig.)

1936 **693. (06 (.73)**
Engineering News-Record, No. 10, March 5, p. 356.
American Concrete Institute convention adopts new **building code.** (5 700 words.)

1936 **621 .6 (.73) & 625 .4 (.73)**
Engineering News-Record, No. 11, March 12, p. 373.
O'LEARY (W.). — The hazard of live gas mains in **subway construction.** (3 800 words, 2 tables & fig.)

1936 **621 .116 & 669 .1**
Engineering News-Record, No. 11, March 12, p. 379.
Caustic embrittlement of steel accelerated by silicates. (600 words.)

1936 **624 .2**
Engineering News-Record, No. 11, March 12, p. 382.
YOUNG (T. P.). — **Continuous truss design** by moment distribution. (1 700 words & fig.)

1936 **669 & 721 .**
Engineering News-Record, No. 11, March 12, p. 395.
High-strength metals for construction service. (2 80 words & 1 table.)

1936 **385. (072 (.73) & 625 .1 (06 (.73**
Engineering News-Record, No. 12, March 19, p. 428.
Research needs stressed by railway engineers. (4 50 words.)

Great Western Railway Magazine. (London.)

1936 **625 .15 (.42) & 625 .17 (.42**
Great Western Railway Magazine, April, p. 169.
BOWLER (F. T.). — Great Western Railway **permanent way practice.** — No. X. (2 200 words & fig.)

Journal, Institution of Civil Engineers. (London

1936 **625 .13 (.42**
Journal, Institution of Civil Engineers, April, p. 47
ANDERSON (D.). — **The construction of the Mersey Tunnel.** (Paper and discussion.) (33 000 words & fig

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1936 **66**
Journal, Institution of Civil Engineers, April, p. 54
SINNAT (F. S.). — Some major problems in the **utilization of coal.** (14 500 words & fig.)

Journal, Institute of Transport. (London.)

1936 **656 .21**
Journal, Institute of Transport, March, p. 273.
OWEN (Sir David J.). — The future of port contr with special reference to the possibilities of groupin (12 000 words.)

1936 **621 .3**
Journal, Institute of Transport, March, p. 286.
MYERS (W. H.). — **Main railway line electrificatio** with special reference to conditions in New Sou Wales. (3 800 words & 2 tables.)

1936 **6**
Journal, Institute of Transport, March, p. 292.
PAYNE (H. W.). — The application of **commerci salesmanship to transport.** (4 000 words.)

1936 **656 (.4**
Journal, Institute of Transport, March, p. 299.
LISSENDEN (G. B.). — **The future of transpo** (Paper and discussion.) (3 800 words.)

1936 **656**
Journal, Institute of Transport, April, p. 318.
MACKINNON (L.). — The **organisation of a ro passenger transport undertaking.** (4 000 words & fi

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1936 **656 (.8**
Journal, Institute of Transport, April, p. 342.
WREN (A. C.). — **Economic transport developme** in the Argentine. (5 700 words.)

Mechanical Engineering. (New York.)

1936 **621 .13 (093**
echanical Engineering, February, p. 84.
KIMBALL (D. S.). — **The steam engine** in the nine-nth century. (3 400 words & fig.)

1936 **621**
echanical Engineering, February, p. 95.
LUCKE (C. E.). — **Progress in power.** — A review. 500 words.)

1936 **614 .7 & 697**
echanical Engineering, February, p. 109.
HATCH (Th.). — Fundamental factors in the design **exhaust systems.** (5 000 words.)

1936 **669**
echanical Engineering, March, p. 165.
Seizure of **metals** at elevated temperatures and me-ods of testing for propensity toward seizure. (3 000 rds & fig.)

1936 **62. (01, 621 .134 .1 & 669**
echanical Engineering, March, p. 169.
TEMPLIN (R. L.). — Aluminum **connecting-rods.** 300 words & fig.)

1936 **613 .1 & 614**
echanical Engineering, March, p. 171.
DRINKER (P.). — Uses and limitations of **respira-ry protective equipment.** (3 500 words & fig.)

1936 **621 .7 & 621 .9**
echanical Engineering, April, p. 222.
SCHNEIDER (A. W.). — **Finishing internal surfaces.** 000 words & 1 table.)

1936 **621 .7 & 621 .9**
echanical Engineering, April, p. 250.
Machine-shop practice. — **Methods of joining of ma-rials** used in strong, light structures. (2 000 words & g.)

Modern Transport. (London.)

1936 **656. 253 (.42) & 656 .255 (.42)**
odern Transport, No. 883, February 15, p. 3.
Reducing branch line operating costs. — A simple d unorthodox **signalling installation** on the L. N. E. y. (2 300 words & fig.)

1936 **621 .132.3 (.43)**
odern Transport, No. 883, February 15, p. 7.
Streamlining of German steam-hauled trains. (1 600 rds & fig.)

1936 **659**
odern Transport, No. 883, February 15, p. 8.
ORTON (G. E.). — **Railway publicity.** — A work of owing importance and complexity. (1 500 words.)

1936 **656 .25 (.42)**
Modern Transport, No. 883, February 15, p. 9.
ROBERTS (W. S.). — **Progress in railway signalling.** — Need for studying fundamentals. (2 000 words.)

1936 **385 .113 (.42)**
Modern Transport, No. 886, March 7, p. 3.
Railway results for 1935. — No. 2. — Expenditure and net revenue. (1 400 words & tables.)

1936 **621 .43**
Modern Transport, No. 886, March 7, p. 4.
Diesel-electric shunting locomotives. (1 300 words & fig.)

1936 **621 .43**
Modern Transport, No. 886, March 7, p. 5.
Railcar operation on main and branch lines. (4 600 words & fig.)

1936 **625 .216**
Modern Transport, No. 886, March 7, p. 6.
Buffer resistance. — Value of rubber springs (900 words.)

1936 **385 .21 (.44)**
Modern Transport, No. 886, March 7, p. 7.
Mechanical traction on French canals. Electric locomotives and tractors. (2 000 words & fig.)

1936 **621 .33 (.42)**
Modern Transport, No. 886, March 7, p. 9.
Southern Railway **electrification.** — London to Portsmouth. (1 000 words & fig.)

1936 **621 .132.3 (.43) & 621 .132 .8 (.43)**
Modern Transport, No. 886, March 7, p. 11.
Another German **steam train record.** — Streamlined locomotive attains 120 m. p. h. (1 200 words & fig.)

1936 **621 .132.7 & 621 .43**
Modern Transport, No. 887, March 14, p. 4.
Petrol unit for light shunting. — Replacing the horse by 6 h. p. motor. (1 200 words & fig.)

1936 **621 .43**
Modern Transport, No. 887, March 14, p. 7.
Shunting engines for New Zealand and Mexico. — Drewry petrol and oil-engined units. (1 350 words & fig.)

1936 **656 .1 (.41)**
Modern Transport, No. 888, March 21, p. 3.
Replacing a railway by road services. (1 500 words & fig.)

1936 **385 .113 (.54)**
Modern Transport, No. 888, March 21, p. 4.
Indian Railways. — Twelve months' review. (1 200 words.)

1936 **621 .132.3 (.71)**
Modern Transport, No. 888, March 21, p. 5.
British-built locomotives for Newfoundland. — Two **2-8-2 type superheated engines.** (600 words & fig.)

1936 **656 .211.7 (.42 + .44)**
Modern Transport, No. 889, March 29, p. 3.
Forthcoming **cross Channel train ferry service.** — Progress on the Dover-Dunkirk scheme. (3 300 words & fig.)

1936 **621 .43 (.43) & 656 .225 (.43)**
Modern Transport, No. 889, March 29, p. 5.
Transit of small consignments. — Special service to eliminate delays. (2 100 words & fig.)

1936 **621 .43 (.43) & 625 .616 (.43)**
Modern Transport, No. 889, March 29, p. 7.
German light railway development. — **Diesel railcars** on 2 ft. 6 7/8 in. Gauge line. (1 000 words & fig.)

1936 **621 .43 (.85)**
Modern Transport, No. 890, April 4, p. 3.
Passenger railcar for Peru. — Six-wheeled unit with Ford engine. (1 300 words & fig.)

1936 **621 .132.3 (.68) & 621 .132.5 (.68)**
Modern Transport, No. 890, April 4, p. 5.
Large 4-8-2 type engines for passenger and freight services, South African Railways. (1 300 words & fig.)

1936 **656 .23 & 656 .1**
Modern Transport, No. 891, April 11, p. 3.
WOOD (W. V.). — **Railway charges and road competition.** Present inequality must be adjusted. (2 200 words.)

1936 **621 .43 (.943)**
Modern Transport, No. 891, April 11, p. 5.
Oil-engined traction in Queensland. (1 200 words & fig.)

1936 **385 .1 (.54)**
Modern Transport, No. 891, April 11, p. 7.
Future of Indian Railways. — Effect of Government of India Act. (2 400 words.)

1936 **621 .43 (.73)**
Modern Transport, No. 892, April 18, p. 3.
Streamlined five-car Diesel train for U. S. A. (800 words & fig.)

1936 **621 .338 (.494)**
Modern Transport, No. 892, April 18, p. 5.
Electric railcar trains for Switzerland. (3 000 words & fig.)

1936 **656 (.42)**
Modern Transport, No. 892, April 18, p. 6.
Present position of transport. — Railways propose adjustment of relationship with road haulage. (2 300 words.)

Proceedings, American Society of Civil Engineers. (New York.)

1936 **669 .1 & 721 .9**
Proceed., Amer. Soc. of Civil Engineers, March, p. 361.
Structural alloy and heat-treated steels. (15 000 words & tables.)

1936 **7**
Proceed., Amer. Soc. of Civil Engineers, March., p. 39
Wind-bracing in steel buildings. (6 400 words, 1 tabl & fig.)

Proceedings, Institution of Mechanical Engineers (London.)

1936 **532 & 53**
Proceed., Institut. of Mechanical Engineers, Vol. 13 p. 3.
FAGE (A.). — **Aerodynamical research and hydrauli practice.** (25 000 words & fig.)

1936 **621 .**
Proceed., Institut. of Mechanical Engineers, Vol. 13 p. 75.
SINCLAIR (H.). — Recent developments in **hydrau lic couplings.** (41 000 words & fig.)

1936 **621 .**
Proceed., Institut. of Mechanical Engineers, Vol. 13 p. 193.
HAWORTH (H. F.) & LYSHOLM (A.). — Progres in design and application of the Lysholm-Smith **torqu converter,** with special reference to the development i England. (7 000 words & fig.)

1936 **621 .**
Proceed., Institut. of Mechanical Engineers, Vol. 13 p. 231.
HAHN (W.). — Voith **turbo transmissions.** (12 00 words & fig.)

1936 **621 .8 & 656 .212.**
Proceed., Institut. of Mechanical Engineers, Vol. 13 p. 283.
LISTER (R. B.). — **Mechanical handling** as applie to industry. (5 400 words & fig.)

1936 **534 & 61**
Proceed., Institut. of Mechanical Engineers, Vol. 13 p. 479.
HUTCHINSON (A. C.). — **Noise.** (13 000 words & fig.

Railway Age. (New York.)

1936 **656 .284 (.73**
Railway Age, No. 10, March 7, p. 382.
The Florida hurricane. (2 000 words & fig.)

1936 **625 .111 (.73) & 625 .162 (.73**
Railway Age, No. 10, March 7, p. 386.
BLAKE (H. D.). — **How Wisconsin spends Federa funds.** (4 600 words & fig.)

1936 **621 .132.3 (.73) & 621 .132.8 (.73**
Railway Age, No. 10, March 7, p. 391.
Pennsylvania « streamlines » a steam passenger loc motive. (1 400 words & fig.)

1936 **621 .43 (.73**
Railway Age, No. 10, March 7, p. 397.
WILSON (J. R.). — **Diesel electric freight locomotiv** (3 000 words & fig.)

1936 **625 .173 (.73)**
ilway Age, No. 10, March 7, p. 405.
Blizzard battle wins acclaim. (2 000 words & fig.)

1936 **533 & 656 .221**
ilway Age, No. 11, March 14, p. 425.
SILLCOX (L. K.). — **Savings by weight reduction and reamlining.** (4 000 words & fig.)

1936 **625 .2 (06 (.73)**
ilway Age, No. 11, March 14, p. 435.
A. R. E. A. holds enthusiastic convention. (40 000 rds.)

1936 **656 .213 (.73)**
ilway Age, No. 12, March 21, p. 496.
Railroad marine operations in New York harbor. 600 words.)

1936 **621 .13 (0 & 656 .284**
ilway Age, No. 12, March 21, p. 499.
RUSSELL (F.). — **Can boiler explosions** due to low ter be prevented ? (2 000 words & fig.)

1936 **656 .254 (.73)**
ilway Age, No. 12, March 21, p. 503.
Repeaters improve train dispatching. (1 300 words.)

1936 **385. (072 (.73) & 625 .1 (06 (.73)**
ilway Age, No. 12, March 21, p. 505.
BUDD (R.). — **New opportunities. — Research will nt the way.** (3 300 words.)

1936 **656 .284 (.73)**
ilway Age, No. 12, March 21, p. 524.
HOWARD (N. D.). — **What the floods** in Pennsylnia did to railroads. (7 800 words & fig.)

1936 **621 .132.3 (.73), 621 .132.8 (.73) & 625 .232 (.73)**
ilway Age, No. 13, March 28, p. 534.
New streamliner delivered to Illinois Central. (1 200 rds & fig.)

1936 **385 .1 (.73) & 385 .4 (.73)**
ilway Age, No. 13, March 28, p. 537.
EASTMAN (J. B.). — **The Government and transt.** (2 400 words.)

1936 **621 .43 (.73)**
ilway Age, No. 13, March 28, p. 539.
Boston & Maine rail car. (1 000 words & fig.)

1936 **621 .43 (73) & 656 .1 (.73)**
ilway Age, No. 13, March 28, p. 545.
The Seabord Air Line has many highway operations. 600 words & fig.)

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ilway Engineering and Maintenance. (Chicago.)

1936 **625 .13 (.73) & 693 (.73)**
ilway Engineering & Maintenance, February, p. 74.
Large scale operations speed tunnel relining project. 300 words & fig.)

1936 **625 .174 (.73)**
Railway Engineering & Maintenance, February, p. 79.
O'ROURKE (G. M.). — **Why trains run on time** — when blizzards tie up buses and trucks. (2 000 words & fig.)

1936 **625 .143 (0 (.73) & 625 .143.4 (.73)**
Railway Engineering & Maintenance, February, p. 82.
How flexible are long rails ? — Laying continuous welded rails involving length of more than a mile, Delaware and Hudson R. R. (2 200 words & fig.)

1936 **625 .142.2 (.73) & 691 (.73)**
Railway Engineering & Maintenance, February, p. 88.
How good is **timber treatment ?** (2 500 words & fig.)

Railway Gazette. (London.)

1936 **621 .132.8 (.66)**
Railway Gazette, No. 6, February 7, p. 243.
New **3 ft. 6 in. gauge Beyer-Garatt locomotives** for Nigeria. (3 500 words & fig.)

1936 **385. (091 (.51)**
Railway Gazette, No. 6, February 7, p. 249.
The Canton-Hankow Railway. (1 400 words & fig.)

1936 **625 .216 (.42)**
Railway Gazette, No. 7, February 14, p. 289.
ARTHURTON (R. I. D.). — A new **automatic coupler** for railway vehicles. (2 700 words & fig.)

1936 **656 .253 (.42) & 656 .225 (.42)**
Railway Gazette, No. 7, February 14, p. 292.
New and economical system of **single-line signalling** Pilmoor-Knaresborough, L. N. E. Ry. (1 700 words & fig.)

1936 **621 .132.3 (.62)**
Railway Gazette, No. 7, February 14, p. 297.
New **mixed-traffic locomotives** for the Egyptian State Railways. (700 words & fig.)

1936 **656 .1 (.42)**
Railway Gazette, No. 7, February 14, p. 301.
The G. W. R. and road transport. (1 100 words & fig.)

1936 **656 .256 (.42) & 656 .258 (.42)**
Railway Gazette, No. 8, February 21, p. 333.
Bethnal Green — Enfield **colour-light signalling,** L. N. E. Ry. (2 400 words & fig.)

1936 **621 .133.8**
Railway Gazette, No. 8, February 21, p. 340.
A new **speed indicator** and accorder for locomotives. (900 words & fig.)

1936 **621 .132.3 (.42)**
Railway Gazette, No. 8, February 21, p. 345.
New American **4-8-4 type locomotives.** (250 words & fig.)

1936 **656 .222.1 (.7)**
Railway Gazette, No. 8, February 21, p. 350.
ALLEN (C. J.). — **Railway speeds in 1935.** — 2 — North America. (2 700 words & tables.)

1936 **625 .4 (.493)**
Railway Gazette, No. 8, February 21, p. 358.
The Brussels Nord-Midi Junction Railway. (650 words & fig.)

1936 **625 .2 (01 & 625 .235**
Railway Gazette, No. 13, March 27, p. 613.
PANNEL (E. V.). — **Aluminum in rolling stock construction.** (1 700 words.)

1936 **621 .132.8 (.65)**
Railway Gazette, No. 13, March 27, p. 615.
New express passenger Beyer-Garratt locomotives for Algeria. (3 500 words & fig.)

1936 **625 .232 (.42)**
Railway Gazette, No. 13, March 27, p. 622.
New open type third class carriages, Southern Railway. (750 words & fig.)

1936 **621 .9 (.42)**
Railway Gazette, No. 13, March 27, p. 624.
A heavy spring coiling machine. (1 500 words & fig.)

1936 **656 .222.1 (.44 + .489 + .493)**
Railway Gazette, No. 13, March 27, p. 630.
ALLEN (C. J.). — **Railway speeds in 1935.** — 4. France, Belgium, and Denmark. (2 000 words & 3 tables.)

1936 **621 .392 (.42) & 624 (.43)**
Railway Gazette, No. 14, April 3, p. 652.
BONDY (O.). — **Welded plate girder bridges** for railways. (1 600 words & fig.)

1936 **621 .131.1, 621 .133.1 & 656 .222.1**
Railway Gazette, No. 14, April 3, p. 655.
The influence of speed on locomotive haulage capacity and fuel consumption. (2 100 words & tables.)

1936 **625 .234 (.945)**
Railway Gazette, No. 14, April 3, p. 959.
Air-conditioning on the Victorian Railways. (1 600 words & fig.)

1936 **621 .138.5 (.42)**
Railway Gazette, No. 14, April 3, p. 661.
Improvements at Doncaster works, L. N. E. R. (1 800 words & fig.)

1936 **621 .132.5 (.729)**
Railway Gazette, No. 14, April 3, p. 663.
New 4-8-0 type locomotive, Jamaica Government Railway. (1 000 words & fig.)

1936 **621 .94 (.42)**
Railway Gazette, No. 14, April 3, p. 665.
Turning locomotive wheels. (200 words & fig.)

1936 **621 .13, 625 .2 & 669**
Railway Gazette, No. 15, April 10, p. 700.
JOHNSON (L. W.). — **Nickel steels** in railway engineering. — I. (1 600 words & fig.)

1936 **625 .1 (.489) & 625 .7 (.489**
Railway Gazette, No. 15, April 10, p. 705.
£ 28 million Danish road and rail scheme. (1 000 words & fig.)

1936 **347 .763 (.43**
Railway Gazette, No. 15, April 10, p. 711.
Road transport legislation in Germany. (1 100 words & fig.)

1936 **621 .138.5 (.42) & 621 .9 (.42**
Railway Gazette, No. 15, April 10, p. 713.
Machining locomotive parts at Crewe Works, L. M. Ry. (400 words & fig.)

1936 **656 .213 (.44**
Railway Gazette, No. 15, April 10, p. 715.
The gare transatlantique, Le Havre. (450 words fig.)

1936 **625 .144.4 & 625 .**
Railway Gazette, No. 16, April 17, p. 736.
Track maintenance by measured shovel packing (1 1 words & fig.)

1936 **621 .133.5 (.5**
Railway Gazette, No. 16, April 17, p. 738.
Lemaître variable blast pipe. (700 words & fig.)

1936 **621 .13, 625 .24 &**
Railway Gazette, No. 16, April 17, p. 739.
JOHNSON (L. W.). — **Nickel steels** in railway engineering. — II. (1 800 words & fig.)

1936 **385 .59 (.436) & 651 (.43**
Railway Gazette, No. 16, April 17, p. 742.
MAYER (F.). — **The Central staff register** of t Austrian Federal Railways. (1 400 words & fig.)

1936 **625 .232 (.4**
Railway Gazette, No. 16, April 17, p. 745.
Irish dining car experiments. (700 words & fig.)

1936 **656 .253 (.492) & 656 .258 (.49**
Railway Gazette, No. 16, April 17, p. 746.
Power signalling in Holland. (800 words & fig.)

1936 **656 .283 (.4**
Railway Gazette, No. 16, April 17, p. 756.
Ministry of Transport accident report. — Collis at Shrivenham. Great Western Railway, January 1936. (2 800 words & fig.)

1936 **621 .43 (.4**
Diesel Ry. Traction, p. 586, Supplt. to Ry. Gazet March 20.
Armstrong-Withworth locomotives for L. M. S. (2 500 words & fig.)

1936 621 .43 & 625 .25
esel Ry. Traction, p. 593, Supplt. to Ry. Gazette, March 20.
McCUNE (J. C.). — The **braking** of high-speed Diesel ins. (2 000 words & fig.)

1936 621 .43
esel Ry. Traction, p. 596, Supplt. to Ry. Gazette, March 20.
A symposium on **railcars.** (3 300 words & fig.)

1936 621 .132.8 (.42) & 621 .43 (.42)
esel Ry. Traction, p. 766, Supplt. to Ry. Gazette, April 17.
More L. M. S. Ry. **Diesel-electric shunters.** (2 600 rds & fig.)

1936 621 .43 (06
esel Ry. Traction, p. 773, Supplt. to Ry. Gazette, April 17.
Report of the **Diesel engine** Users Association. (200 rds & 1 table.)

1936 621 .132.8 (.66) & 621 .43 (.66)
esel Ry. Traction, p. 774, Supplt. to Ry. Gazette, April 17.
Diesel **shunters** for West Africa. (800 words & fig.)

1936 621 .43 (.438)
esel Ry. Traction, p. 776, Supplt. to Ry. Gazette, April 17.
Diesel railcar progress in Poland. (2 000 words & fig.)

1936 621 .43 (0 (.42)
esel Ry. Traction, p. 780, Supplt. to Ry. Gazette, April 17.
Railcar developments in France. (900 words.)

1936 621 .33 (.42)
ectric Ry. Traction, p. 489, Supplt. to the Ry. Gazette, March 6.
The Portsmouth **electrification.** (600 words & fig.)

1936 621 .33 (.42)
ectric Ry. Traction, p. 493, Supplt. to the Ry. Gazette, March 6.
British railway **electrification.** Views of railway irmen. (1 200 words.)

1936 621 .333
ectric Ry. Traction, p. 494, Supplt. to the Ry. Gazette, March 6.
The limitations of **D. C. and A. C. motors.** (900 words fig.)

1936 621. 331 (.73)
ectric Ry. Traction, p. 682, Supplt. to the Ry. Gazette, April 3.
Rectifier **substations** on the Long Island Railroad. 00 words & fig.)

1936 621 .33 (.485)
Electric Ry. Traction, p. 683, Supplt. to the Ry. Gazette, April 3.
Railway electrification in Sweden. (250 words & fig.)

1936 621 .33 &.621 .8
Electric Ry. Traction, p. 684, Supplt. to the Ry. Gazette, April 3.
A new **individual axle drive.** (200 words & fig.)

1936 621 .331 & 66
Electric Ry. Traction, p. 685, Supplt. to the Ry. Gazette, April 3.
Corrosion in rectifier cooling systems. (600 words.)

1936 621 .33 (.481)
Electric Ry. Traction, p. 686, Supplt. to the Ry. Gazette, April, 3.
The latest **electric railway** in Norway. (600 words & fig.)

Railway Magazine. (London.)

1936 656 .222.1 (.44)
Railway Magazine, March, p. 162.
French railway speeds in 1935. (2 300 words & tables.)

1936 656 .212.5 (.42)
Railway Magazine, March, p. 187.
NOCK (O. S.). — New **marshalling yard** at Hull, L. N. E. R. (2 000 words & fig.)

1936 656 .222.1 (.43 + .489 + .493)
Railway Magazine, April, p. 241.
German, Belgian, and Danish **railway speeds** in 1935. (2 600 words & tables.)

1936 656 .222.1 (.42)
Railway Magazine, April, p. 247.
ALLEN (C. J.). — **British locomotive practice and performance.** (4 900 words & fig.)

Railway Mechanical Engineer. (Philadelphia.)

1936 621 .132.3 (.73)
Railway Mechanical Engineer, February, p. 45.
Chesapeake & Ohio **4-8-4 type locomotives** for heavy passenger service. (1 800 words, tables & fig.)

1936 621 .132.8 (.42)
Railway Mechanical Engineer, February, p. 53.
Turbine locomotive built by London Midland & Scottish Ry. (2 500 words & fig.)

1936 625 .232 (.73) & 625 .235 (.73)
Railway Mechanical Engineer, March, p. 89.
Stainless steel coach for the Santa Fe. (3 000 words & fig.)

1936 621 .132.5 (.73)
Railway Mechanical Engineer, March, p. 95.
Detroit, Toledo & Ironton **locomotives.** (1 300 words & fig.)

1936 **621 .43 (.73) & 656 .284 (.73)**
Railway Mechanical Engineer, March, p. 97.
Cause of fire on Santa Fe Diesel locomotives. (1 800 words.)

1936 **313 : 625 .234 (.73)**
Railway Mechanical Engineer, March, p. 98.
Passenger cars air-conditioned during 1935. (Tables.)

1936 **621 .138.5 (.73) & 625 .26 (.73)**
Railway Mechanical Engineer, March, p. 112.
The New Heaven Readville **wheel shop.** (2 200 words, 2 tables & fig.)

1936 **621 .138.5 (.73)**
Railway Mechanical Engineer, March, p. 119.
Omaha **locomotive shops kinks.** (2 400 words & fig.)

Railway Signaling. (Chicago.)

1935 **656 .258.1 (.73)**
Railway Signaling, February, p. 65.
Automatics replace two attended plants at crossings on Florida Roads. (1 500 words & fig.)

1935 **625 .162 (.73) & 656 .259 (.73)**
Railway Signaling, February, p. 67.
Crossing protection includes signals for directing trains. (4 700 words & fig.)

1935 **625 .162 (.73) & 659 .259 (.73)**
Railway Signaling, February, p. 74.
Street traffic signals controlled by trains. (1 400 words & fig.).

1935 **656 .254 (.73)**
Railway Signaling, February, p. 76.
TROTH (R. W.). — **Remote control** on the Frisco. (2 400 words & fig.)

1935 **656 .253 (.73)**
Railway Signaling, February, p. 79.
ZANE (W. F.). — **Electric switch lamps.** 2 800 words & fig.)

1936 **656 .258 (.73)**
Railway Signaling, March, p. 123.
Chesapeake & Ohio **remote control.** (2 500 words & fig.)

1936 **656 .256.3 (.73) & 656 .256.3 (.73)**
Railway Signaling, March, p. 126.
New **automatics** on the Missouri Pacific. (2700 words & fig.)

1936 **625 .162 (.73) & 656 .259 (.73)**
Railway Signaling, March, p. 131.
$ 500 000 crossing protection program of Illinois. (3 300 words & fig.)

1936 **656 .253 (.73**
Railway Signaling, March, p. 136.
WEATHERBEE (W. B.). — The Delaware, Lack wanna & Western's **approach-lighting system f semaphore signals.** (800 words & fig.)

1936 **625 .26 (06 (.73**
Railway Signaling, March, p. 137.
Signal section of A. A. R. convenes in Chicago. Brief abstracts of reports on cost of train stops, ec nomies effected by signalling, new aspects for high train speeds, etc., and explanations of modern develo ments. — Summary of discussions. (9 900 words & fig

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1936 **656 .253 (.73**
Railway Signaling, March, p. 145.
BENDER (F. W.). — **Power switch operation** primary batteries. (500 words & fig.)

1936 **625 .162 (.73) & 656 .259 (.73**
Railway Signaling, March, p. 146.
Signals installed at 26 crossings in Dubuque, J (2 600 words & fig.)

The Locomotive. (London.)

1936 **621 .132.8 (.6**
The Locomotive, 15 February, p. 32.
New **4-6-2 + 2-6-4 Beyer-Garratt locomotives** for t Nigerian Ry. (2 200 words & fig.)

1936 **621 .43 (.8**
The Locomotive, 15 February, p. 35.
Diesel-electric railcars, Buenos Aires Western Ry. (7 words & fig.)

1936 **625 .245 (.4**
The Locomotive, 15 February, p. 43.
Boggie tipping wagons with continuous brakes, G man Railways. (700 words & fig.)

1936 **621 .331 (.48**
The Locomotive, 15 February, p. 55.
Portable sub-station, Swedish State Railways. (7 words & fig.)

1936 **621 .132.5 (.44) & 656 .222.1 (.4**
The Locomotive, 15 February, p. 57.
Aerodynamical train experiments, P. L. M. Ry. (1 9 words & fig.)

1936 **621 .132.3 (.6**
The Locomotive, March 14, p. 67.
2-6-0 locomotives, Egyptian State Railways. (words & fig.)

1936 **621 .132.8 (.49**
The Locomotive, March 14, p. 68.
LABRIJN (P.). — **Streamlined locomotive,** Neth lands Railways. (1 000 words & fig.)

1936 **621 .132.3 (.51)**

e Locomotive, March 14, p. 71.

Pacific type locomotives, Kiangnan Railway, China. 00 words & fig.)

1936 **621 .132.6 (.43)**

e Locomotive, March 14, p. 73.

2-4-2 tank locomotive for the German National Rys. 200 words & fig.)

1936 **625 .4 (.47)**

e Locomotive, March 14, p. 77.

PHILLIPS (A.). — **Moscow Metropolitan Railway.** 400 words & fig.)

Transit Journal. (New York.)

1936 **621 .33 & 621 .43**

ansit Journal, February, p. 51.

« All-service » vehicles highly successful. (800 words fig.)

1936 **621 .33 (.73) & 625 .174 (.73)**

Transit Journal, March, p. 86.

How United Electric Railways of Providence meets orm emergencies. (1 000 words & fig.)

University of Illinois Bulletin. (Urbana.)

1933 **537 .8**

iversity of Illinois Bulletin, No. 260, August 15.

BROWN (H. A.), TYKOCINER (J. T.) & PAINE . B.). — **Investigation of cable ionization** characteris- s with discharge detection bridge. (14 000 words & .)

1933 **621 .116 & 621 .133.7**

iversity of Illinois Bulletin, No. 261, October 24.

STRAUB (F. G.). — The cause and prevention of cium sulphate scale in **steam boilers.** (22 000 words, bles & fig.)

1933 **621 .43**

iversity of Illinois Bulletin, No. 262, October 31.

HERSHEY (A. E.) & PATON (R. F.). — **Flame tem- ratures in an internal combustion engine** measured spectral line reversal. (13 500 words, tables & fig.)

1934 **621 .82**

iversity of Illinois Bulletin, No. 263, February 13.

WILSON (W. M.). — **The bearing value of rollers.** 200 words, tables & fig.)

1934 **62. (01 & 621 .88**

iversity of Illinois Bulletin, No. 264, March 13.

MOORE (H. F.) & HENWOOD (P. E.). — **The ength of screw threads under repeated tension.** (3 700 rds, tables & fig.)

1934 **697**

University of Illinois Bulletin, No. 266, April 10.

KRATZ (A. P.) & KONSO (S.). — **Investigation of warm-air furnaces and heating systems.** — Part VI. (40 000 words, tables & fig.)

1934 **691 & 721 .3**

University of Illinois Bulletin, No. 267, June 5.

RICHART (F. E.) & BROWN (R. L.). — **An investigation of reinforced concrete columns.** (24 000 words, tables & fig.)

In Spanish.

Anales de la Asociación de Antiguos Alumnos del I. C. A. I. (Madrid.)

1936 **621 .335**

Anales de la Asociación de Antiguos Alumnos del I. C. A. I., marzo, p. 136.

LAZARO (P. V.). — **El control eléctrico en las locomotoras y automotores** de corriente continua. (2 700 palabras & fig.) (Continuará.)

Boletín de la Asociación General de transportes por vía férrea. (Madrid.)

1936 **621 .132.8 (.43) & 621 .43 (.43)**

Boletín de la Asociación General de transportes por vía férrea (Suplemento), enero, p. 1.

Nueva **locomotora Diesel** de 1 400 C. V. con transmisión hidráulica de la Reichsbahn. (2 800 palabras & fig.)

1936 **621 .43**

Boletín de la Asociación General de transportes por vía férrea (Suplemento), enero, p. 7; febrero, p. 19.

Descripción del sistema de **transmisión eléctrica** Asea-Akerman. (6 600 palabras & fig.)

1936 **621 .43**

Boletín de la Asociación General de transportes por vía férrea (Suplemento), febrero, p 20.

Características de la **transmisión eléctrica** Jeumont para automotores. (2 400 palabras & fig.)

1936 **621 .43 (.460)**

Boletín de la Asociación General de transportes por vía férrea (Suplemento), marzo, p. 29.

Automotores Renault de 265 CV., entregados por material móvil y construcciones a la Compañía de los Caminos de Hierro del Norte de España. (6 600 palabras & fig.)

1936 **621 .43 & 625 .25**

Boletín de la Asociación General de transportes por vía férrea (Suplemento), marzo, p. 41.

El **frenado en los trenes Diesel** de gran velocidad. (2 300 palabras.)

Ferrocarriles y Tranvías. (Madrid.)

1936 **656**

Ferrocarriles y Tranvías, abril, p. 108.

REPARAZ (F.). — Consideración económico-política de la **coordinación de los transportes terrestres.** (4 700 palabras & fig.)

1936 **656 .235.5 (.460)**

Ferrocarriles y Tranvías, abril, p. 114.

Tarifa especial para el transporte por « **containers** » en los ferrocarriles españoles. (4 300 palabras.)

Hormigón y Acero. (Madrid).

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Hormigón y Acero, marzo, p. 85.

BOLOMEY (J.). — Influencia de la adición de polvo de piedra al cemento en la calidad del **hormigón.** (3 000 palabras & fig.)

Los Transportes. (Madrid.)

1936 **656. (.460)**

Los Transportes, N° 422, 15 de abril, p. 85.

Reglamentación de servicios de transportes por carretera. (2 700 palabras & fig.)

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Los Transportes, N° 422, 15 de abril, p. 88.

La **coordinación de transportes** en los principales países. (2 400 palabras, 1 mapa & fig.)

Revista de Obras Públicas. (Madrid.)

1936 **62. (01 & 721 .9**

Revista de Obras Públicas, N° 8, 15 de abril, p. 153.

CANDAU PARIAS (R.). — Flexión en piezas rectangulares de **hormigón armado.** (700 palabras.) (Continuará.)

1936 **656 (.43)**

Revista de Obras Públicas, N° 9, 1° de mayo, p. 170.

AGUILAR (M.). — **Autovías y ferrocarriles** en Alemania. (2 100 palabras.)

1936 **62. (01 & 721 .9**

Revista de Obras Públicas, No 9. 1° de mayo, p. 179.

CANDAU PARIAS (R.). — Flexión en piezas rectangulares de **hormigón armado.** (200 palabras & cuadros.)

Rieles argentinos. (Buenos Aires.)

1936 **656**

Rieles argentinos, marzo, p. 56.

SIMONS (H.). — La **coordinación de los transportes** en el tráfico urbano. (7 000 palabras.)

In Italian.

La tecnica professionale. (Firenze.)

1936 **625 .234 (.**

La tecnica professionale, aprile, p. 77.

GAVAZZENI. — Il **riscaldamento** con la regolazi automatica della temperatura sui treni della li Milano-Varese-Porto Ceresio. (4 500 parole & fig.)

1936 **621 .335 (.**

La tecnica professionale, aprile, p. 83.

ZATTONI (T.). — Note sui **contattori elettropn** matici. (3 400 parole & fig.)

Rivista tecnica delle ferrovie italiane. (Roma

1936 **625 .2 (0 & 656 .**

Rivista tecnica delle ferrovie ital., N° 4, aprile, p. 1

CORBELLINI (G.). — Determinazione della **resiste** aerodinamica del materiale rotabile ferroviario diante esperimenti alla vasca idrodinamica. (5 600 par & fig.)

1936 **625 (.**

Rivista tecnica delle ferrovie ital., N° 4, aprile, p. 2

SANTUCCIONE (D.). — L'**autocamionale** Geno Valle del Po. (2 400 parole & fig.)

In Dutch.

De Ingenieur. (Den Haag.)

1936 **625 .1**

De Ingenieur, Nr. 13, 27 Maart, p. V. 15.

ORTT (C.). — Reactietijd van autobestuurders **onbewaakte overwegen.** (3 000 woorden & fig.)

1936 **621 .**

De Ingenieur, Nr. 13, 27 Maart, p. V. 18,

VAN SCHOUWENBURG (W. H.). — **Motortractie spoorwegen.** (3 600 woorden.)

1936 **624 & 6**

De Ingenieur, Nr. 14, 3 April, p. Bt. 19.

KIST (H. J.). — Toepassing van gewapend bet plaatliggers bij **bruggen en viaducten** voor gewoon v keer. (2 300 woorden & fig.)

1936 **624**

De Ingenieur, Nr. 15, 10 April, p. B. 59.

MICHIELSEN (H. F.). — De **berekening van balk** welke over de geheele lengte veerend ondersteund zi (2 500 woorden.)

1936 **669**

De Ingenieur, Nr. 18, 1 Mei, p. Bt. 25.

FRANX (C.). — **Hoogwaardig staal** in verband m de G. B. V. 1930. (5 400 woorden.)

Spoor- en Tramwegen. (Utrecht.)

1936 **656**

oor- en Tramwegen, Nr. 7, 31 Maart, p. 145.

NAPP-ZINN (A. F.). — **Verkeerswetenschap.** (3 800 orden.)

1936 **656 .213 (.492)**

oor- en Tramwegen, Nr. 7, 31 Maart, p. 150.

BURGERS (W. L. C.) & STARING (M.). — De ploitatie van de **kolenoverslaghaven** te Born. (3 200 orden & fig.)

1936 **621 .43 (.494)**

oor- en Tramwegen, Nr. 7, 31 Maart, p. 154.

De **Diesel-mechanische « Leichttriebwagen »** der Zwitrsche Bondsspoorwegen. (800 woorden & fig.)

1936 **625 .19**

oor- en Tramwegen, Nr. 8, 14 April, p. 169.

Brandgevaar langs de spoorwegen. (3 000 woorden.)

1936 **621 .43**

oor- en Tramwegen, Nr. 8, 14 April, p. 176.

Lichte automotrices in dienst der spoorwegen. (2 500 orden & fig.) (Slot volgt.)

1936 **656 (.492)**

oor- en Tramwegen, Nr. 9, 28 April, p. 193.

Nogmaals het **werkverkeer,** de nederlandsche werkver en het particulier vervoersfront. (2 800 woorden.)

1936 **385 (.494)**

oor- en Tramwegen, Nr. 9, 28 April, p. 199.

Reorganisatie en saneering der Zwitsersche Bondsoorwegen. (2 500 woorden.)

In Portuguese.

Gazeta dos caminhos de ferro. (Lisboa).

1936 **385 .1**

Gazeta dos caminhos de ferro, N° 1159, 1 de abril, p. 191.

AVELAR RUAS. — **A crise** nos caminhos de ferro. (1 700 palavras.)

In Polish.

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1936 **621 .13 = 91 .885**

Inzynier Kolejowy, N° 4, p. 132.

PAWLOWSKI (A.). — **Locomotive design** in Poland and elsewhere. (2 400 words.)

1936 **621 .392 = 91 .885**
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Inzynier Kolejowy, N° 4, p. 134.

WALIGORSKI (T.). — **Track maintenance** by means of **welding.** (4 300 words & fig.)

1936 **625 .5 (.438) = 91 .885**

Inzynier Kolejowy, N° 4, p. 139.

RAABE (E.). — The Zakopane (Kuznice) — Kasprowy Wierch **telfer line.** (5 700 words & fig.)

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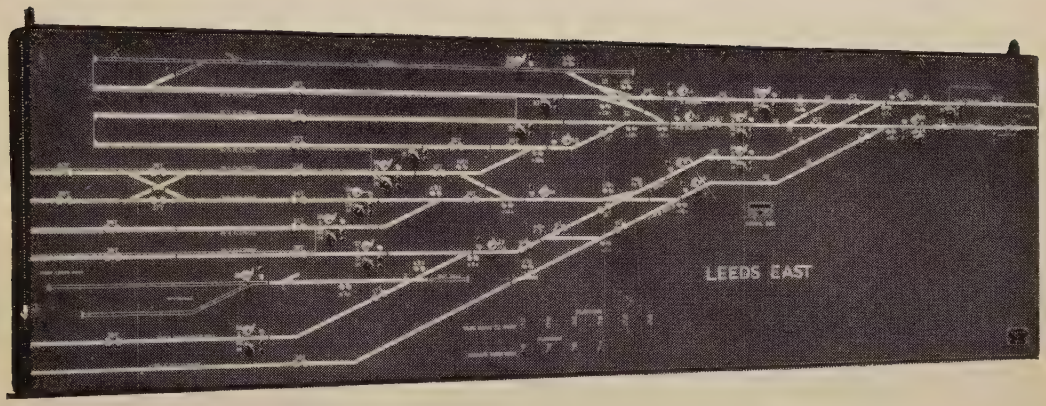

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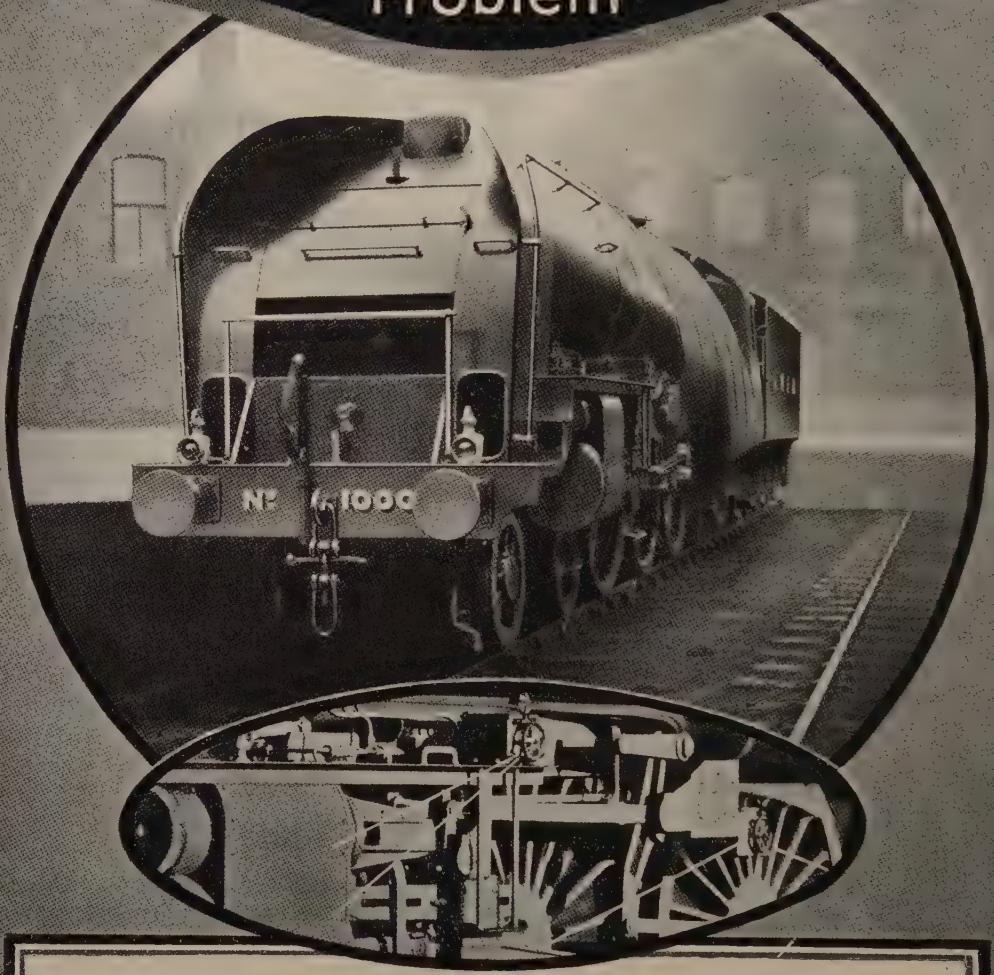

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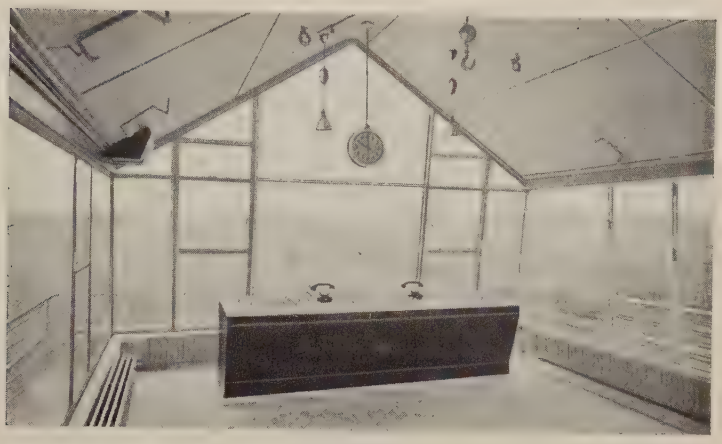

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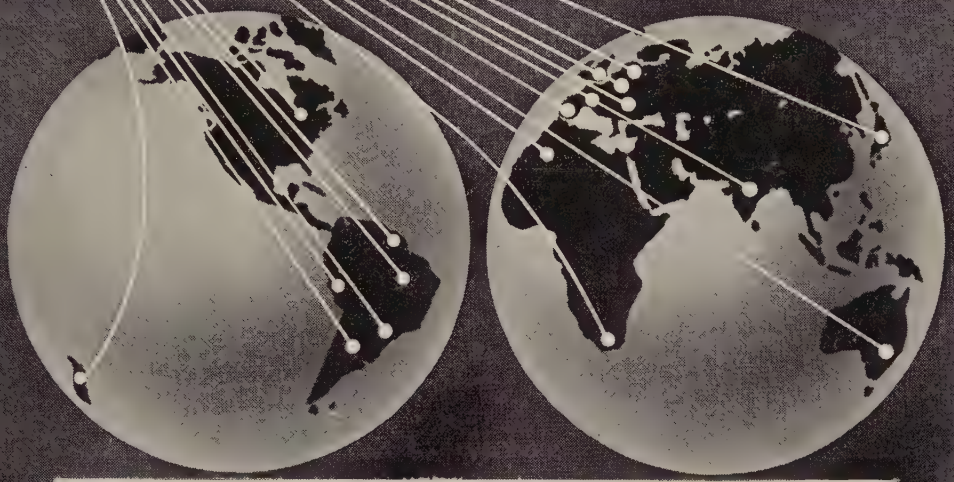

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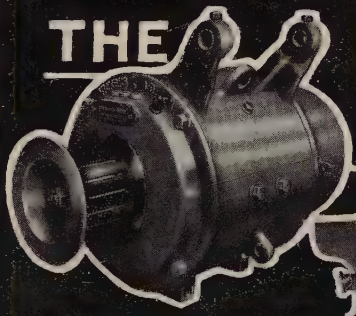
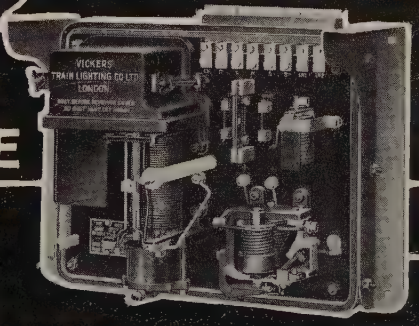
THE  DOES THE WORK

AND THE  CONTROLS THE LIGHT

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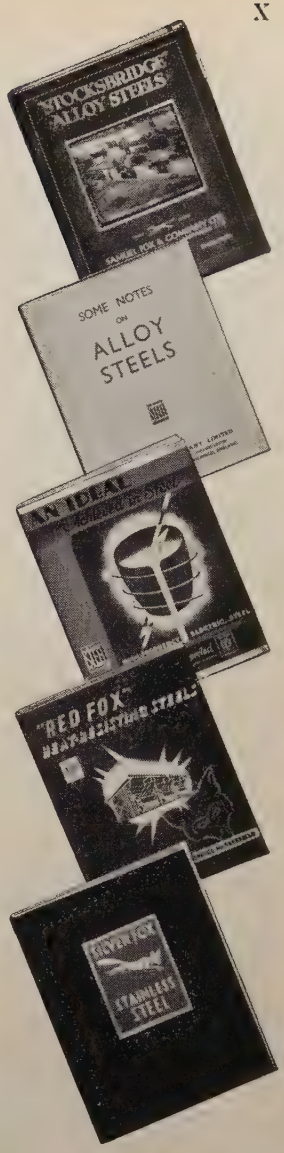

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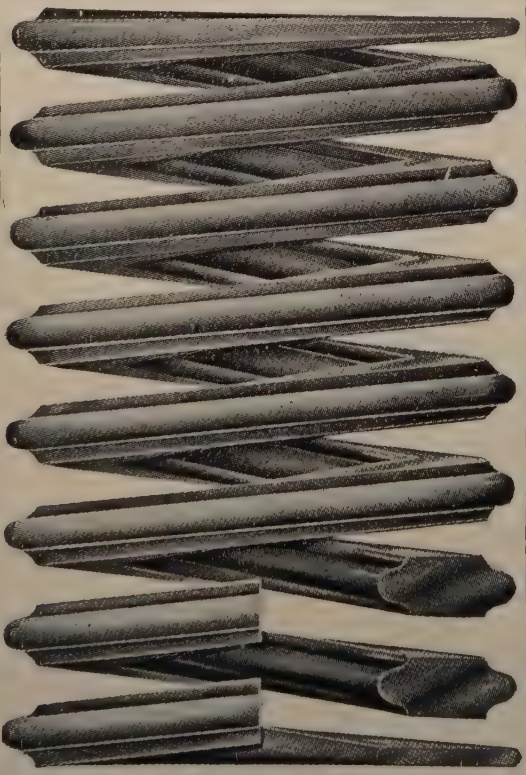

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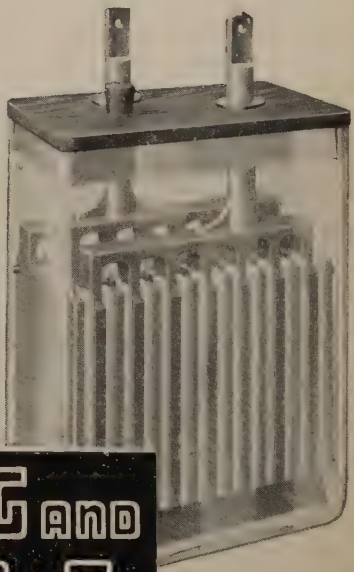

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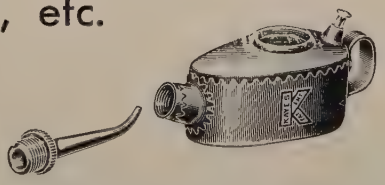

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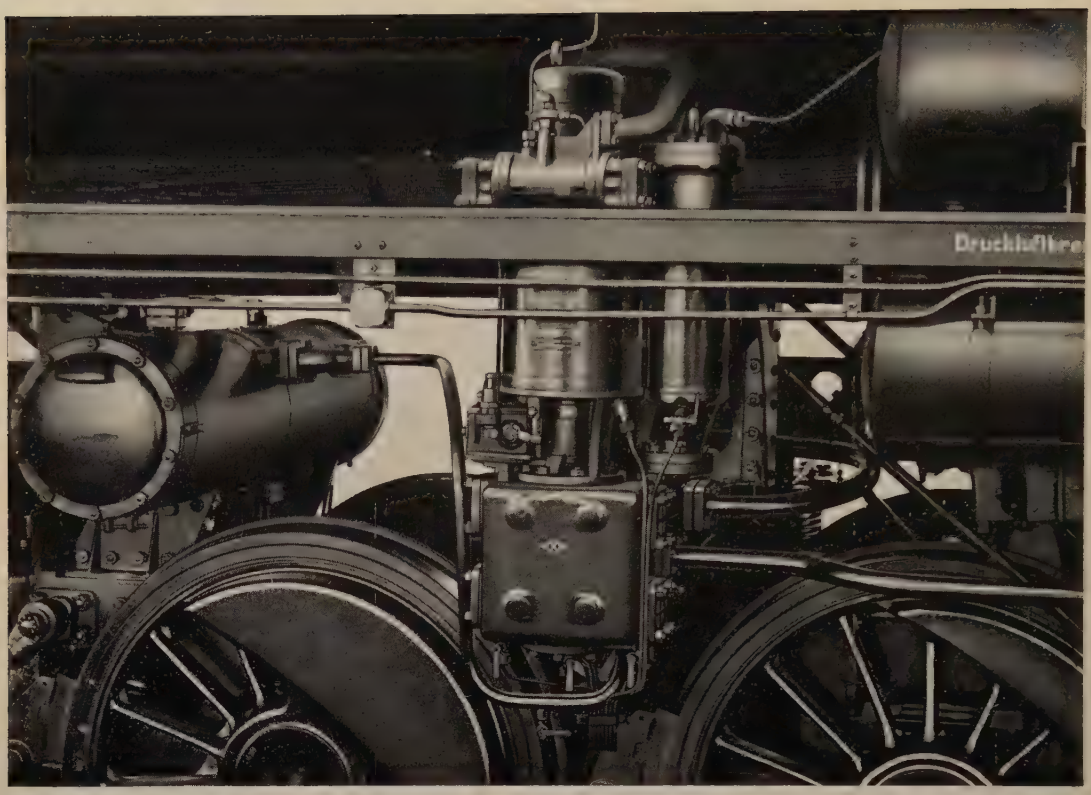

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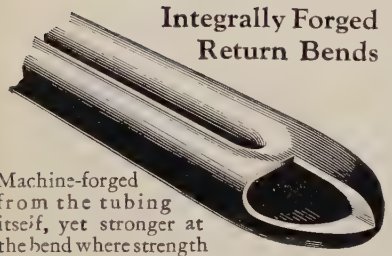

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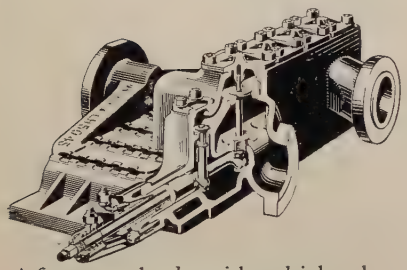

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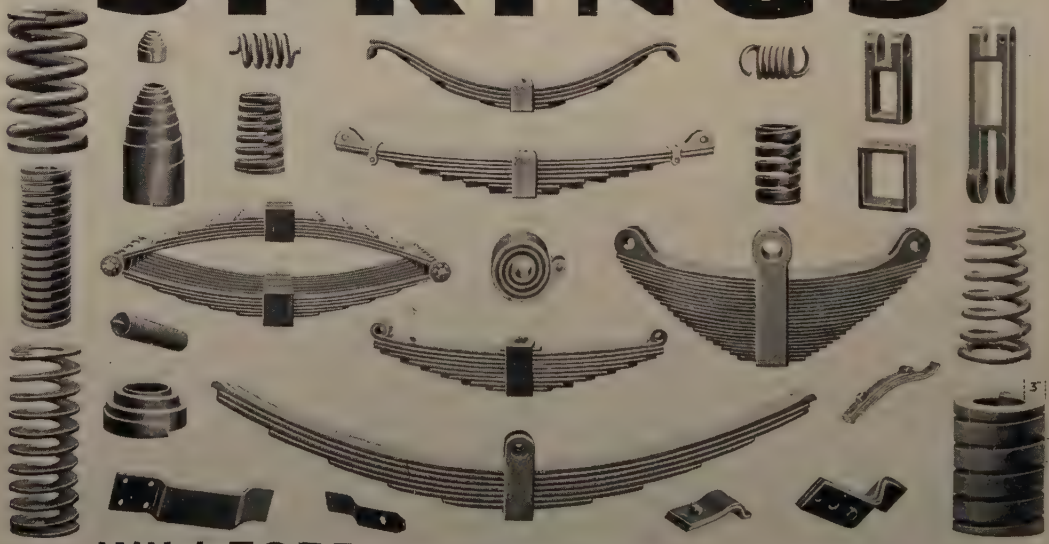

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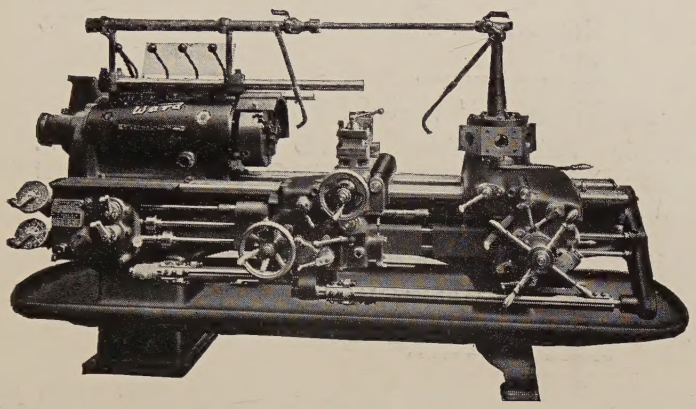

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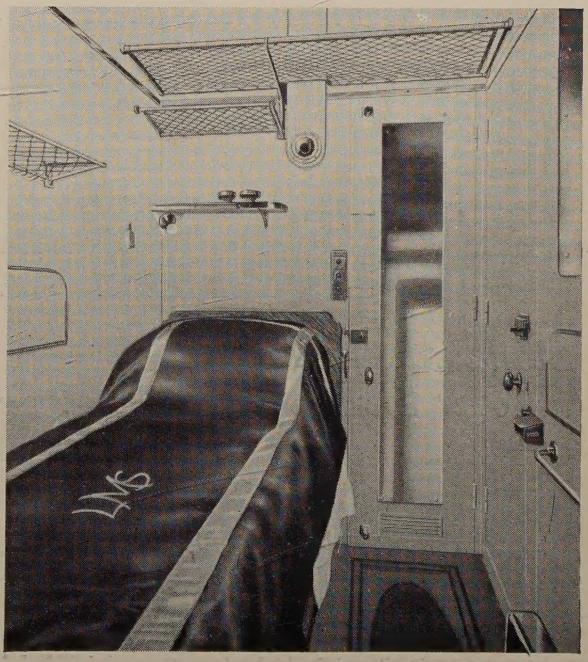

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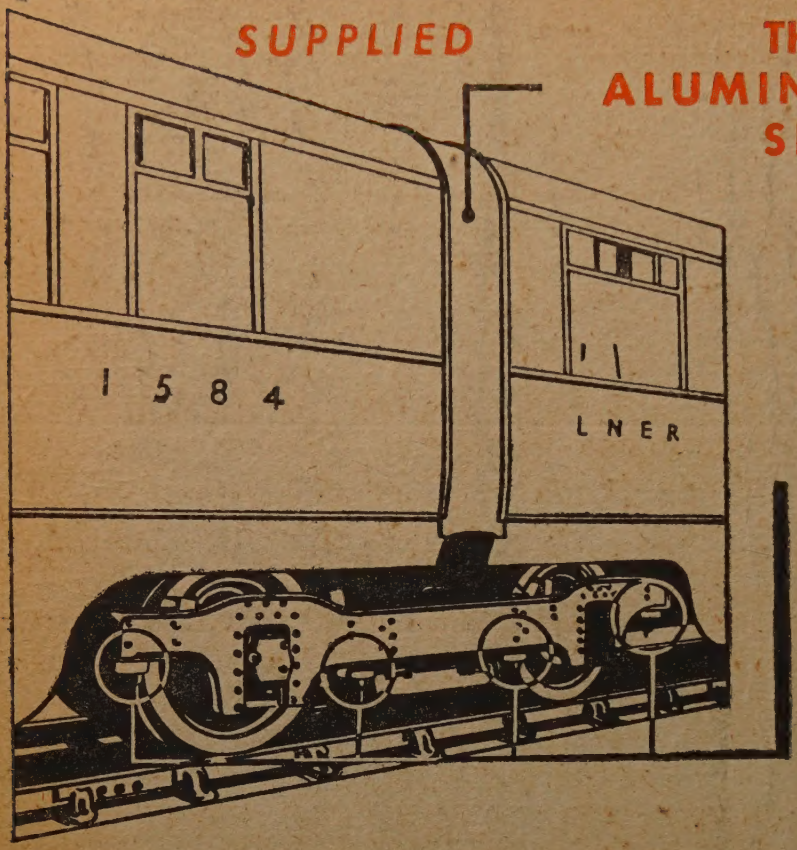

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